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ELECTRICAL CONTRACTING

With which is consolidated
The Electragist
and Electrical Record

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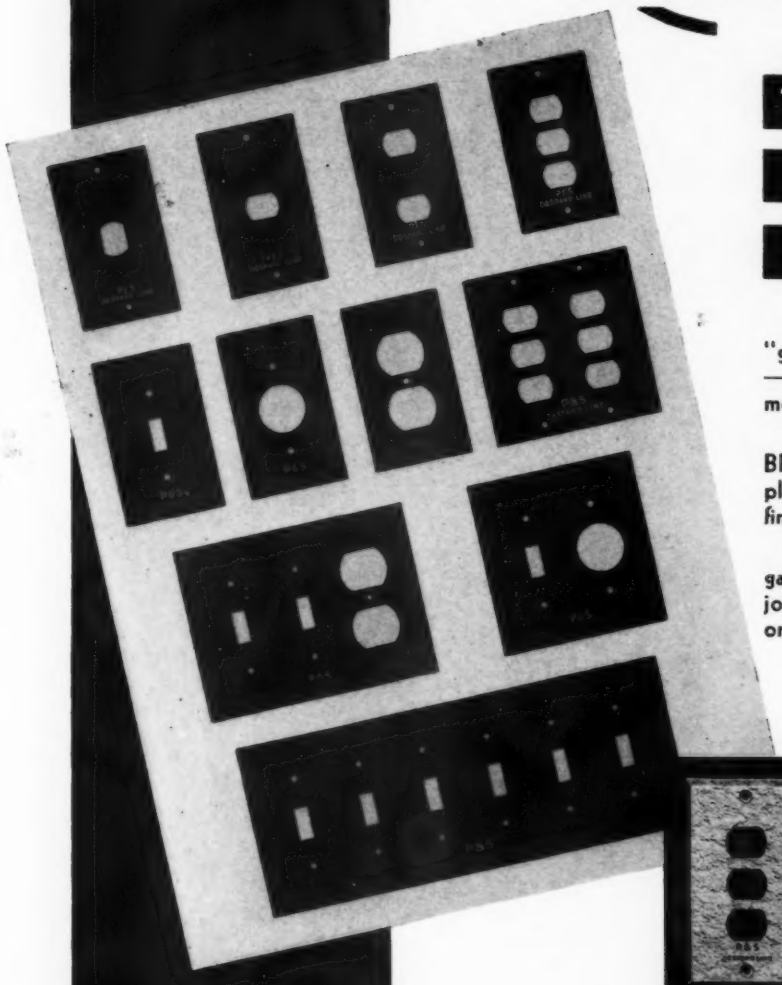

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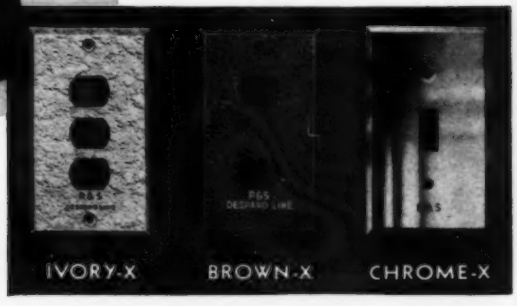

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ELECTRICAL CONTRACTING

AUGUST
1937

Nose Or No Nose!

ACCORDING TO A FRIEND OF MINE, men should have been designed with two noses. His complaint is that he needs one nose for breathing purposes and another to have colds in.

IT ISN'T A BAD IDEA. Yet, after all, it's only an alibi. For if a man will use some common sense, he won't have colds. It reminds me of the besetting sin of the electrical contractor.

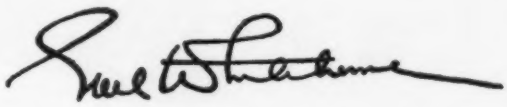
A CONTRACTOR IS NATURALLY A MECHANICAL MINDED MAN. He likes tools and materials. He likes to plan and put things together—to build. And that's all right and good; but too many contractors get so absorbed in the mechanical side of their work, they forget to be good business men. Selling is just a cold in the head to them.

BUT THERE ARE THREE PARTS to any contracting business—the construction, the financial and selling. Unless these three are in balance there is no success and no fun in it. And of the three, selling is the hardest. The wiring and the accounting are under your control. Selling depends on what the customer likes and wants to do. *And it must continually change with the times.*

THIS CONTRACTING BUSINESS WILL BE GOOD OR BAD in the next few years, largely according to the selling job the contractor does. There can be more wiring in 10,000,000 old houses and 2,000,000 new ones. There can be rewiring in 200,000 commercial buildings. There can be modernization in 100,000 factories—if they are sold in the right way.

AND THIS WORK CAN BE DONE by the qualified contractor on a profitable basis—if he will adapt his business to the market of today. He must make intelligent use of advertising. He must sell with instruments and facts—not just estimates and argument. He must organize for mass production. It is a new situation. It needs new methods.

BUT IF YOU WAIT FOR ANOTHER NOSE TO USE FOR SELLING, somebody else will take over this business some bad day. It may be Sears Roebuck or a great syndicate wiring chain or perhaps the government. Then what? Nose or no nose, we've got to do this job.



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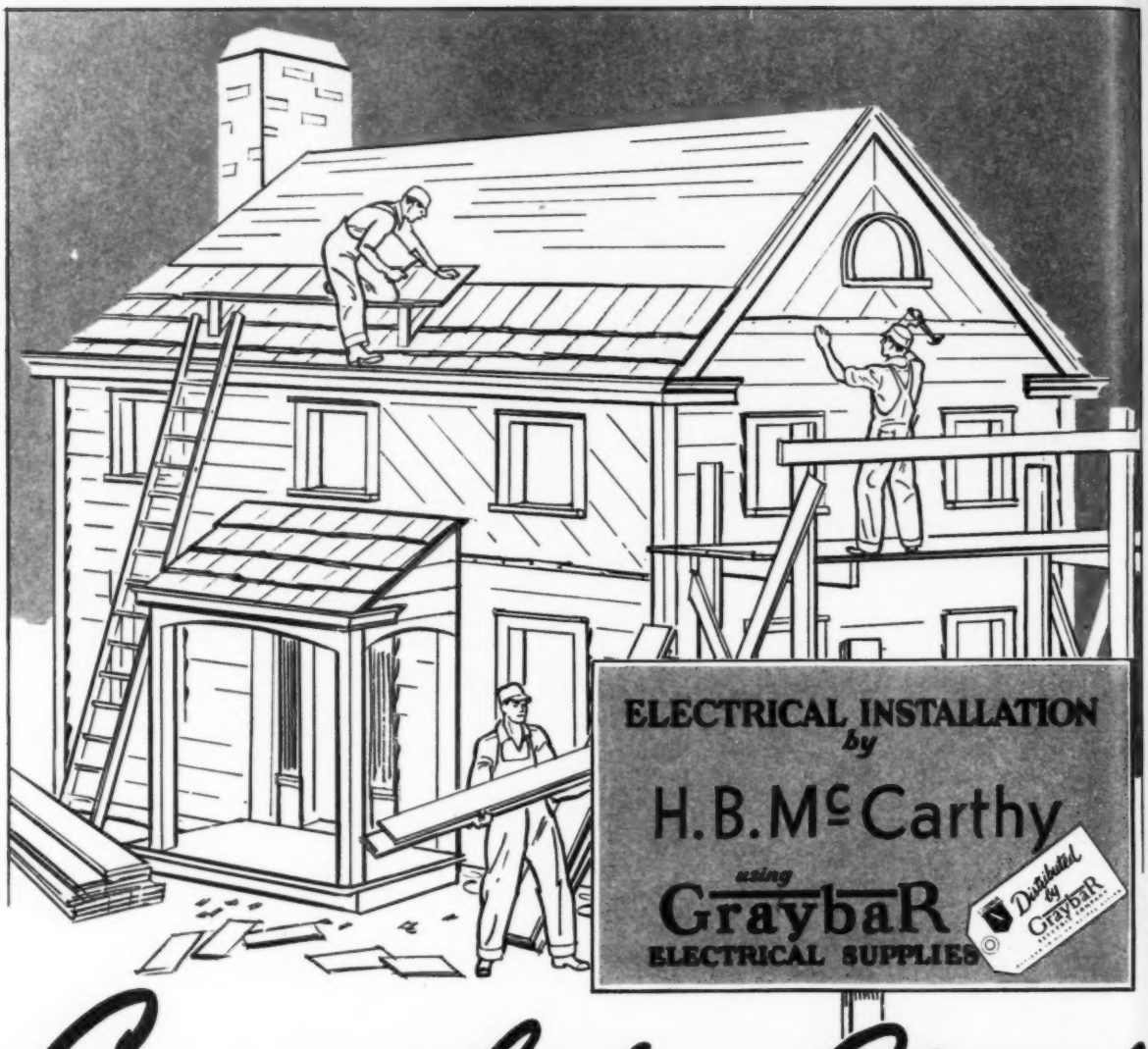

Congratulations, Mac!

We're glad to see you've landed that job. And we're ready to help you. For your convenience . . . when you're in a hurry . . . we've installed quick, intelligent counter service. (Drop in and try it.) Don't hesitate to call on Graybar for any electrical item, small or large . . . at any time . . . for any type of construction . . . from a one-car garage to a school or factory building.

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TREASURE HOUSE—*Facade of United States National Archives Building, one of the new monumental structures fronting on Constitution Avenue.*

Guarding the Archives

By Albert A. Schuhler

BEHIND THE COLUMNS—*Main entrance from Constitution Avenue, with the great bronze doors opened.*

ONE of the outstanding protective signaling systems in this country has recently been installed in the United States National Archives Building in Washington. This building was designed to house our country's valuable documents and records. Among them are historical papers, legislative, military and pension records, World War films and other treasures. Eventually the original copies of the Declaration of Independence and the Constitution of the United States will be transferred from the Library of Congress and enshrined there. Every means known to modern science was employed to protect the contents of this building against burglary, fire and theft.

A combination of alarm and record systems was used—

1. A Guard or Watchman's Patrol
2. A Manual Fire Alarm
3. An Automatic Fire Alarm
4. A Burglary and Theft Alarm

All these systems are controlled and electrically supervised by equipment installed in the headquarters of the Captain of the Guards. At this point, a supervisor is on duty at all times to watch the record as it is written and to cope with any emergency arising.

It all focuses in central supervisory control equipment mounted on a large steel desk. The first recorder shown (left on the cabinet) receives the signals from the guard or watchman's patrol system. The second recorder receives the signals transmitted from the burglar alarm system. The third recorder receives the signal from the manual and automatic fire alarm systems. The signals which terminate in these recorders are transmitted in code, and are automatically transposed by these units into readable English words and Arabic numerals, giving the date and the time when all signals are received. The automatic printing recorders are counter sunk in the flat top of the desk.

The control panels for the systems controlling the recorders are installed in a vertically mounted superstructure to the rear and on top of the desk. The fire alarm control panels, for automatically supervising the fire alarm gongs and stations throughout the building, are located in a wall opposite the control desk. The burglar alarm annunciator shows visual signals nearby.

The whole protective system, as it is organized, is made up of a combination of electrical signals, telephones and a personal patrol service. The premises

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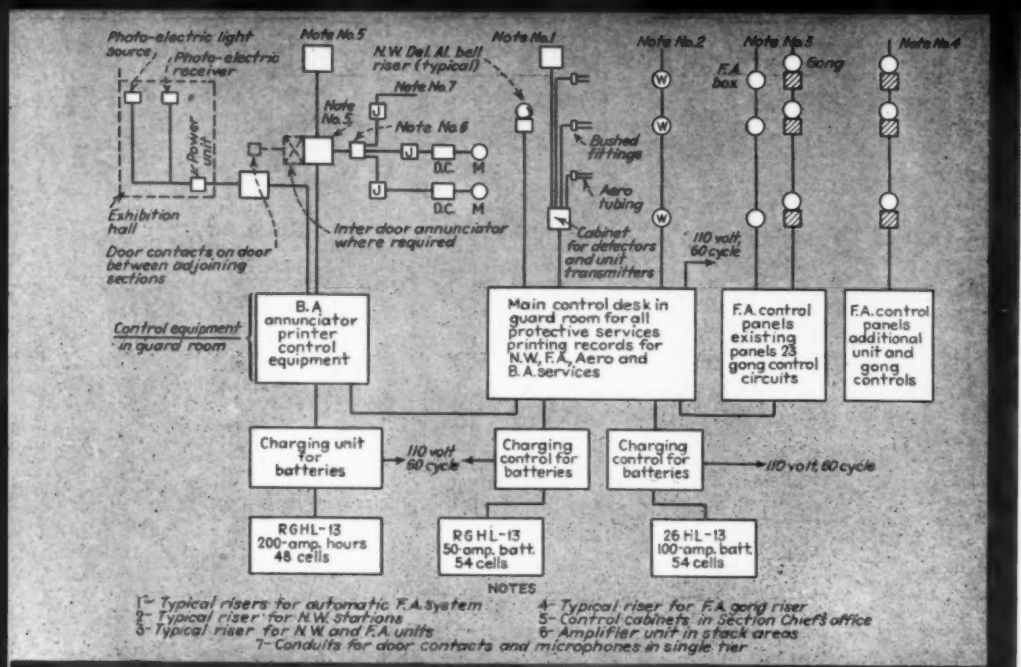


Photo-electric light source
Photo-electric receiver
Power unit
Exhibition hall
Door contacts on door between adjoining sections
Note No. 5
Note No. 7
Note No. 6
Inter door annunciator where required
N.W. Del. Al. bell riser (typical)
Note No. 1
Bushed fittings
Aero tubing
Cabinet for detectors and unit transmitters
Note No. 2
Note No. 3
Note No. 4
F.A. box
Gong
110 volt 60 cycle
Control equipment in guard room
B.A. annunciator printer control equipment
Main control desk in guard room for all protective services printing records for N.W., F.A., Aero and B.A. services
F.A. control panels existing panels 23 gong control circuits
F.A. control panels additional unit and gong controls
Charging unit for batteries
110 volt 60 cycle
Charging control for batteries
Charging control for batteries
110 volt 60 cycle
RGHL-13 200-amp. hours 48 cells
RGHL-13 50-amp. batt. 54 cells
26 HL-13 100-amp. batt. 54 cells
NOTES
1- Typical risers for automatic F.A. system
2- Typical riser for N.W. stations
3- Typical riser for N.W. and F.A. units
4- Typical riser for F.A. gong riser
5- Control cabinets in Section Chief's office
6- Amplifier unit in stack areas
7- Conduits for door contacts and microphones in single tier

GUARD WIRES—*Diagram of wiring installed for signal and communication systems in National Archives Building*

CONTROL DESK—*In this central cabinet in the office of the Captain of the Guards, the fire protective systems focus and all reports are recorded.*

are continuously patrolled by guards on six routes, each having the required number of patrol stations, from which the guards must signal in a fixed sequence. The time required for a guard to visit each station is predetermined; and should a guard either fail to operate the stations in the prescribed sequence, or to arrive at a station, within the time allowed, a signal lamp lights at the control desk. In addition, the designation of the last patrol station, properly visited by the guard, is printed automatically on the recorder.

Each guard is equipped with a portable hand telephone set and an emergency alarm key. The portable hand set enables him to call the supervisor by plugging into a jack at any patrol station. If the supervisor desires to communicate with a guard on patrol, he merely operates an associated calling key on his desk. This action lights the pilot lamps in all of the stations on that watchman's route, and the guard establishes communication by means of the portable hand telephone, when he reaches the next station in his route. Should the guard require assistance on his tour, for any reason, such as illness or the presence of suspicious characters, he inserts an emergency alarm key in the general alarm jack of the patrol station, and then operates the station in the customary manner.

The supervisor is automatically notified by the illumination of a bullseye lamp at the control desk, by the sounding of a buzzer and by the recording of an emergency signal on the printing recorder. The supervisor then dispatches guards to render assistance. The supervisor acknowledges the emergency signal by using a special keyswitch in one of the panels of the superstructure. This confirmation signal is also recorded on the printing recorder.

Electrical supervision of the supervisor, at the control center, is maintained in a manner similar to that used to supervise the guards. The only difference is that the supervisor is stationed at the control desk and turns a small key once every fourteen minutes. If the supervisor fails to turn the key within the prescribed time, a warning buzzer sounds at the control desk. If the supervisor does not use his key within a minute, an emergency alarm follows. The emergency alarm is sounded on three alarm bells installed at the three main entrances to the building. In addition, the pilot lamps in all patrol stations throughout the building are lighted, which notifies all guards to report back to the control center for investigation of the supervisor's delinquency. The use of a special key at the control center silences the emergency alarm signals, and causes a printed record to be made on the recorder.

The entire wiring system is of the highest grade, installed in rigid steel conduit, under Federal specifications. Some of the standards call for zinc coated conduit, limit the length of a run to one hundred feet without a pull box, set the minimum at ¾ inch trade size, 30 per cent Para rubber and braided wire, minimum size No. 12 B&S gauge wire, except in certain circuits where No. 16 is permitted. But in

general, the requirements were no higher than should be expected of a high class job. A general schematic layout of the wiring is shown in the diagram. The work was all done by the Howard P. Foley Co., electrical contractors of Washington. The signalling equipment was manufactured by the American District Telegraph Co. of New York. The architect on this building was John Russell Pope and the engineer, Clyde R. Place.

All of the patrol stations are connected to the main control desk by six three-wire loops. Each three-wire loop has a separate control key arranged so that it is possible to disconnect any specified route in the event of an abnormal line condition. When the trouble loop is disconnected from the remainder of the system, it is possible for the electrician to correct the trouble without interfering with the rest of the system. A ground or an open-circuit, or both, occurring at any one point, or on any one of the three lines, will not impair the proper operation of the system, but will give a warning signal on the control panel.

Manual Fire Alarm System

The building is also equipped with a manual fire alarm system of the positive, non-interfering, pre-signal and successive type. To transmit an alarm, you pull a small handle in one of the fire alarm stations, installed at conspicuous locations throughout the building. This breaks a small glass rod, and releases a plunger, which controls the transmitting mechanism in the station. The glass rod has no effect upon the electrical operation of the station, but is a "tell-tale" to indicate a definite call from a station.

LOCAL STATIONS *(Left and above)—Typical station equipment in bronze, located about the building for guard signals and fire alarms.*

THE SHRINE—*Exhibition Hall in the Archives Building, where the Declaration of Independence and the Constitution eventually will lie in state.*

The fire alarm signal is printed on the fire alarm recorder giving the exact time of the alarm, and the location of the fire alarm station operated. The signal is also sounded on certain so-called official or pilot gongs, installed about the building, where responsible persons may hear and respond to the alarm. In the event of a general alarm, and where it is necessary to notify all persons in the building, a special general alarm plug is inserted in a jack at the fire alarm station, and the pull handle is again operated. This results in the sounding of both the official gongs, and a system of general alarm gongs, throughout the building. All alarms are automatically recorded.

The fire alarm system transmitting circuits are connected to the control desk by a three-wire loop. Each three-wire loop is arranged so that in the event of a ground or open-circuit, or both, at any point, no interference will result in the proper operation of the fire alarm system.

Each official and general alarm gong loop is electrically supervised, and in the event of a ground or open-circuit occurring on any gong loop, an audible signal is given at the control center, and the associated supervising milliameter shows zero. There are thirty general alarm circuits, and one official alarm circuit provided for.

An aero automatic fire alarm system has been installed throughout the stack spaces. This consists of continuous loops or circuits of small copper tubing, 1/12 inch in diameter, attached to the ceiling of the stack area protected. This system employs the rate-of-rise principle, in which any rapid change in temperature in the fire area causes an increased pressure within the tubing sufficient to expand small diaphragms at both ends of the tubing circuit, and establish an electrical contact. The functioning of the diaphragms causes a small relay to "lock-in", and actuates an electro-mechanical transmitter. The signals from the transmitter are received at the automatic fire alarm recorder at the control desk, which prints out the alarm and sounds the code on the local gongs.

In consideration of the priceless and irreplaceable documents which are stored in the stack areas, and because it is virtually impossible to have guards constantly on patrol in these areas, this type of protection is particularly desirable. Fire is detected and reported in its early stages, and guards reach the scene before extensive damage is done.

The transmitting circuit to the automatic fire alarm system is provided in a four-wire loop, which terminates at the control desk. The transmitting features of this four-wire loop are similar to the three-wire loop system used for the manual fire alarm system.

Theft Protection Systems

This system of protection consists of sensitive sound detectors, located at strategic points within the stack areas, and door contacts on all external stack doors. The battery room and the sub-basement doors are also protected with similar contacts. The exhibition hall on the main floor is equipped with photo-electric light sources, and relay units, which establish protective invisible light rays.

The protection system is primarily divided into zones, which in turn, are incorporated into divisions. Each div-

(Continued on Page 74)

UMI

OUR SACRED COW—*Old No. 14 is chewing her cud in our front door and blocking the whole electrical business. It is time to run her out.*

OLD No. 14

By Earl Whitehorne

OUT in India, the cow is sacred to the Hindu. A cow can stand in his front door, head out, admiring the landscape, or lie down in his flower bed or eat the spinach off his wife's hat—if she has a hat—and Mr. Hindu just says—"Lots of luck, Sis Cow!" He thinks it's cute.

But no electrical contractor should laugh. We have a sacred cow of our own in this business, worse than that.

Way back yonder, when young Tom Edison was selling his first lamp—or thereabouts—some smart electrician discovered that No. 14 wire was easy to handle. "O.K.!" sezzee. "I'll use it all the time." He did—and why not? He was only wiring for lights, so many on a circuit, one or two in a room and no desire for any more. People were used to one kerosene lamp and when they wired up, expected to stay wired. So No. 14 became the standard.

I well remember, after the Mexican War—or 1890, to be frank—my father built a new house in Jersey. We were using coal oil. Now it was to be electric light. I was there daily watching the job, assistant to the helper. Of course, we put in No. 14. And fifteen years later, when I was a contractor, we were still putting it in. And now it is thirty years after that and Old Reliable No. 14 is the same prime favorite in the trade, slapped up in every house and everywhere else they can use it.

The horse and buggy is gone. So is the cuckoo clock, the rat trap bustle, the shaving mug with name in gold. We are living in a bran' new world of airplanes, ice cubes, cellophane and shorts. All is changed—except the electrical contractor and his chronic affinity—Old No. 14. They have stuck together through thick and thin, closer than ham and eggs or pork and beans or pigs knuckle and sauerkraut.

Did I say it was a standard? Old No. 14 has become a sacred tradition with the contractor—almost a religion. One God! One flag! One wire! *E pluribus unum!*

Genghis Khan, the Tartar, in the sixteenth century, built him an empire that embraced all northern Asia from the Pacific right through Russia and rode his Mongol horde west to the walls of Vienna, while the churches of Europe rocked with prayers for the salvation of Christianity. Genghis ruled 'em and raped 'em in a big way and made his laws so feared that they remained in force for forty years after his death. Beside him Alexander, Julius Caesar and Napoleon were bush leaguers. But Old No. 14 makes even old Genghis look a piker. For No. 14 has reigned for more than half a century and is still king around the world, reaching from the main switch to what-have-you in every house where guys and gals sit down to dinner.

But it isn't very funny. It is tragic—because right now twenty two million families in this country—and Heaven knows how many stores and offices and factories—are suffering today from that great American ailment *wirebound electric service.* And the entire electrical industry is sick in bed with it—and doesn't know it. For this No. 14 in the branch circuits of all these buildings is blocking the further growth of the electrical business—blocking the contractor, the dealer, the wholesaler, manufacturer and power company. It is about time we looked this thing in the face.

Let's check up now and see just what

—Our Sacred Cow!

it is Old No. 14, our Sacred Cow, is really doing to us:

1. With No. 14, we limit the number of outlets on branch circuits to twelve. So the land is full of homes with too few receptacles to take care of the increased number of appliances that people want to use. Most of these houses were wired for light or light and a fan and flatiron. Now we have 57 varieties of appliances and need bigger wire to feed them.

2. Wanting to enjoy these appliances, people have filled their homes with wire entanglements of cord, snarled up on the floor like worms in a bait can. They look like Hell! They are a nuisance. They blow fuses. They cause fires.

3. So hundreds of thousands of perfectly good appliances, that people bought because they wanted 'em, now lie on dusty shelves, abandoned because they are not convenient. And John and Mary say—"Why buy more?"

4. But it has not stopped with that, because looking for relief, these families set the handy man to work or call in a contractor and add outlets, tacked on here and there, more than Old No. 14 can carry.

5. They also substitute duplex receptacles for the originals and plug in duplex dofunnys and load on all the fuse will hold and then try bigger fuses.

6. Meanwhile—enter the villain *Voltage Drop*. For when you put 15 amperes on No. 14 wire and run it 13 feet, you are down 1 volt. At 25 feet you have lost 2 volts. At 38 feet you are down 3 volts, and 4 volts at 51 feet, and 5 volts at 63. At 126 feet you have lost 10 volts, and at 190 feet you're down 15.

7. And when the pressure is off 5 volts —or 5 per cent, we'll say—the brilliance of lamps is off 15 per cent and the toaster takes maybe 5 minutes instead of 4 to brown the bread and the percolater is slow and the flatiron is not so hot and the efficiency of every appliance in the house is impaired. Both comfort and money are sacrificed. For while you wait for a glue pot to get hot, the meter keeps on turning.

8. And when the system is overloaded, this way, the lights jump every time the oil burner or refrigerator starts up. So more comfort is killed.

9. And when you add more load the current increases, the voltage drops and the wire gets hot and many good watts bought to use are wasted in unwanted heat.

10. And these hot wires cost cash money, too. In fact, with a 1 volt drop, the householder loses 1½ per cent of the cost of current. With a 2 volt drop, he loses 3 per cent, with 5 volts, he is stuck 7½ per cent, with 10 volts—and there are plenty of such cases—15 per cent of his money burns up along the line—or maybe his house.

11. And all the time there is trouble in every motor. At 90 per cent of rated voltage—and it's not unusual—starting torque is down, speed is reduced, temperature rises and the hot motor pulls more current, trying to pick up more speed or torque. This in turn, makes more over-load, more voltage drop, more heat losses.

12. And there is many a citizen knocking the power company because his bill is too high. And there is many a customer, who won't buy more and better wiring because he or she has gone sour on poor electric service.

Now if you don't believe all this—or if you don't think it is important to you—just amuse yourself with this little demonstration. Fix up a rheostat so you can test out lamps, motors and appliances under different voltages. Sam Hibben of Westinghouse showed me. See how the brilliance of a lamp goes off as you reduce voltage. Bore a block of wood with an electric drill and see what low voltage does on that job. Hold your watch on a toaster and note what happens there. Then take a voltmeter some evening and visit the houses of a few friends and customers and check the voltage, with say a 1,000 watt flatiron in the circuit. Go down and feel the temperature of the main switch.

In 1915 the average annual consumption of the homes of this country was 260 kw.hr. In 1925, it was 398. Today it is 743. It is still going up fast. And all this time there has been no increase in the size of wire used in branch circuits. But it can't continue much longer. We have reached a point now where the sale of appliances and the sale of IES lamps has got to taper off unless something is done about wiring. And what happens to the electrical business?

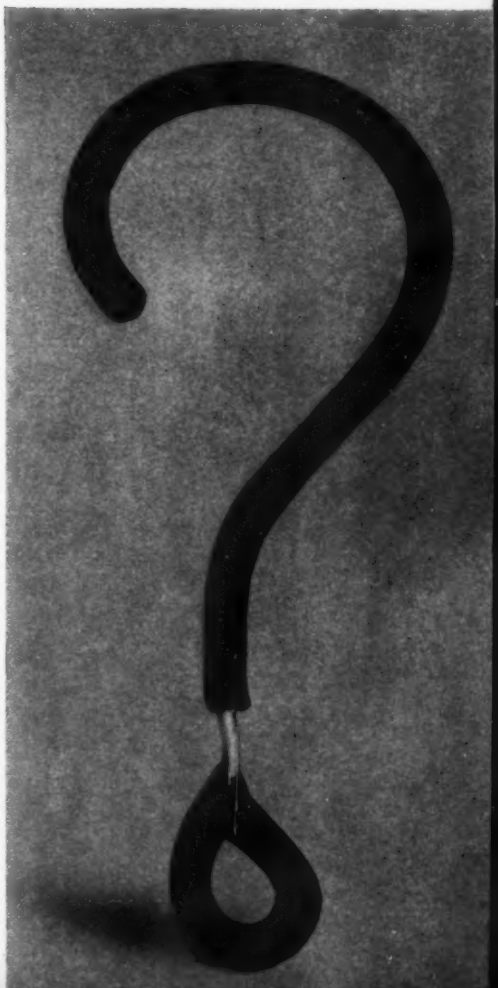
And it is all because the electrical contractor thinks that what was good enough for Old Oscar Pliers, in 1883, is good enough for him. And so he makes the mess continually worse by going right ahead installing branch circuits in otherwise modern houses, with the same No. 14 wire we used in 1890 and in 1905.

What should be done? It is too easy.

The answer is—Install heavier wire! Use No. 12 regularly in branch circuits. And why not? Right now in Toronto they wire 95 per cent of their houses under the local Red Seal standard, which calls for three No. 4's in the service and circuit copper adequate for the local average of 65 outlets per house. And if they can do it, so can we! It costs so little more that the customer is glad to have it, when he knows that it insures him against wire-bound electric service.

Of course, every contractor knows all this. But anyway he is following a foolish habit in sticking to a wire that is too small for modern needs. Why not use larger branch circuit wire? Everything else will be the same—same conduit, same fittings, same labor—only larger wire—and more outlets if he wants to sell them.

It is about time the electrical contractors of America took their Sacred Cow to the slaughter house and got themselves some beef. She is standing smack in our front door, chewing her cud. I am twisting her tail, right now. Let's run her out.



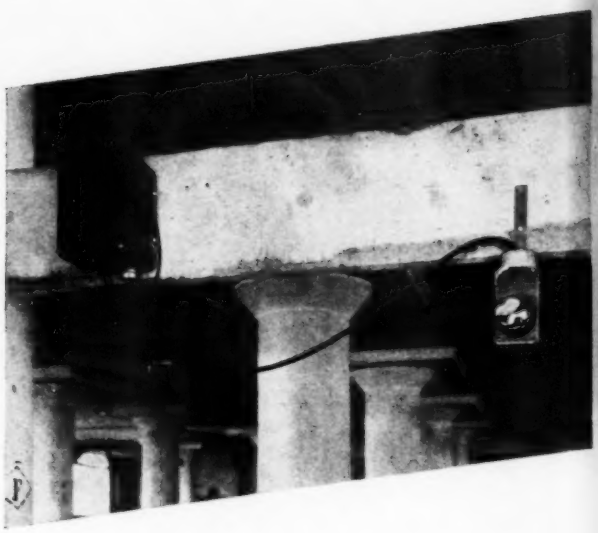
NUMBER 12—*says "How about me?" But nobody listens. Old No. 14 has come to be a binding tradition.*

UMI

LIGHT CONTROL—*The small box on the wall keeps "watching" the illumination level, turns on more lights as needed.*

Sell E

By Donald G. Fink
Managing Editor, Electronics, New York



AUTOMATIC LIGHTING—*Phototube used to control illumination level in store-room.*

The Lowly Radio Tube Is Now Ready for Control Jobs, Available as "package goods." It Requires no Detailed Engineering and Offers a New Market in the Factory, Store, Office and Home

ASK the radio man in your neighborhood if he ever handles special jobs, which have nothing to do with radio. The chances are he does. He may even admit that he has more calls for special work than he knows how to handle. Better look into it.

A customer may want a private loud-speaking telephone system, a photoelectric burglar alarm, an automatic door-opener, a display-window lighting control, or some other item of electronic equipment. Since this equipment uses electron tubes, very similar to those in a radio receiver, he goes to the radio man for advice. But the radio man's line is radio. Electronic control equipment is not supplied by his jobbers, and he has no direct contact with the manufacturers. So he turns down the job. Sometimes the customer turns to the contractor. Often he simply does without.

Such cases are not exceptional. The market for electronic control equipment in homes, offices, and factories, has been growing rapidly during the past five years. The manufacturers have simple electronic units available, which can be installed by any electrician, in the majority of applications. But the idea of electronic control is new, and the contractor, who rightly does not want to involve himself in specialized engineering work, feels that he cannot handle even the over-the-transom jobs, let alone organize an active selling campaign.

But better look into it. The present market for electronic equipment has grown without urging. A little effort could easily develop it into profitable business.

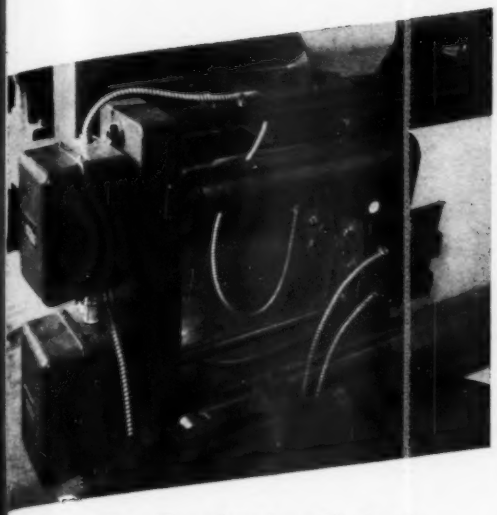
The most important electronic control is the photoelectric cell, the only electrical device which will respond directly to light. It is one of the most useful of electron tubes in the industrial control practice.

A typical installation has the following form:

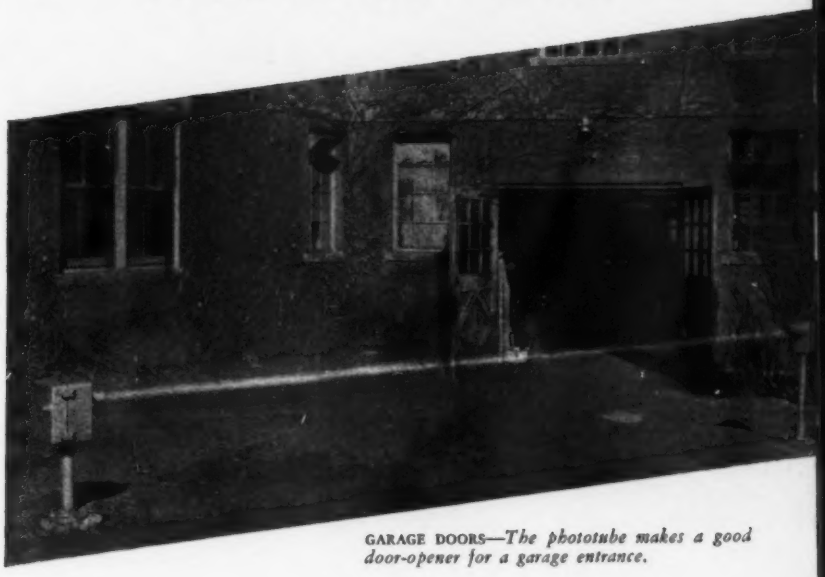
A source of light consisting of an automobile headlight lamp and lens mounted in a standard housing, is set up. Opposite the light source, and contained in a similar housing, is the photoelectric cell. Connected to the cell is an amplifier tube and relay, supplied from 110 volts, 60 cycles. The relay, which has a power-handling capacity of several kw., is connected with the device to be controlled, such as an alarm bell, a motor, a magnetic counter, or a compressed-air door-opener with magnetic valve control, depending upon the desired application. When the beam of light from the headlight lamp to the phototube is interrupted by any object, the relay goes into operation, turning the power circuit either on or off.

Such a set-up can be used to count automobiles on highways or production units on a conveyor belt, to prevent elevator doors from closing on entering passengers, to operate window displays and in countless other applications. For instance, since the photoelectric cell is sensitive to invisible (infra-red) as well as visible light, it is possible to exercise control of the relay circuit even in the dark. For such applications, the light source is fitted with an infra-red filter which removes all the visible light, but allows the infra-red light to strike the phototube. When the beam of infra-red light is interrupted, the relay acts. This type of arrange-

Electronic Controls



PAPER MILL—*Two phototubes guide the edge of the paper used in the manufacture of bags.*



GARAGE DOORS—*The phototube makes a good door-opener for a garage entrance.*

ment is particularly suitable for burglar alarm work, since the intruder has no knowledge of the fact that he has set the alarm in operation.

A recent application of this principle, made by the Signaphone Corp. in cooperation with the General Electric Co. was successful in protecting a floor area of 13,000 sq.ft. by reflecting a single beam of infra-red light back and forth between mirrors arranged on the walls of the enclosure. In this particular case, the relay was used to set in motion an automatic calling mechanism, which phoned the police department, repeated a recorded warning, and then hung up, all automatically.

But the use of the electric eye is not limited to simple on-and-off applications. It can be used to measure the amount of light present in any location. For example, in classrooms, stores, offices and factories, a photoelectric cell, placed near the window to view the intensity of outdoor illumination, can be made to turn on a row of lights near the far wall of the room, when the illumination falls below some predetermined level. All of these applications are performed with standard equipment, which requires a minimum of servicing, beyond replacing tubes approximately every 5,000 hours of use. Several manufacturers make them in forms readily installed.

Another highly useful type of electronic equipment is the capacity-operated relay, or "space control" relay, which operates whenever a person, or other massive object approaches its sensitive antenna. This type of relay operates on the same principle as the old-fashioned radio set which could be tuned by bringing one's hand near the tuning dial. Such devices are highly useful for burglar protection, since they will protect any area within reason, without giving the thief an opportunity to elude its surveillance.

The device consists of a standard housing containing the sensitive circuit, to which is connected a metallic antenna circuit and a power relay. The antenna circuit may be a metallic plate placed under a rug, it may be a wire placed around a door or window, or it may even be the protected object itself, such as a safe or metal cabinet. Whenever any person approaches the antenna circuit, the capacity between his body and the circuit increases. This increase in capacity operates the relay and turns on any desired type of alarm. Capacity-operated relays may also be used for illuminating displays in the presence of a passer-by.

One of the most active of the newer applications of the electron tube is the intercommunicating telephone system. Such units may be plugged into the line wires like any radio set, and use the light line not only for power but for carrying the telephone conversation. Each unit looks very similar to a midget radio receiver and contains four or five tubes and a loudspeaker. The loudspeaker serves as a microphone, when the switch on the panel is in the "talk" position. To secure additional privacy,

(*Continued on page* 62)

ELEVATOR CONTROL—*A phototube keeps the doors from closing when passenger is entering.*

UMI

Hot Wire

A PERSONAL EXPERIENCE

By Edward J. White,
President, Edward J. White, Co., Newark, N.J.

"Eddie" White, electrical contractor, who was dead and is alive again and tells the tale.

DEATH by electric current accidentally passing from the left knee to the right arm for a period of some seven seconds—A fall from a ten foot ladder, through a maze of wires, and barely missing the direct current end of a 500 kilowatt rotary converter—The doctor — The verdict — Then artificial respiration and the pulmotor—Seven weeks of convalescence—And here I am.

It happened one hot, sultry day in August of 1912 that it was our job to install a lead covered cable at the New Brunswick sub-station for a street lighting feeder. This cable came in underground to the cellar and passed up over a rack to a gallery where the street lighting transformers were located. We worked hard and the old brine ran right out of the men until their Sweet-Orrs showed white with perspiration and they were all in. After the cable was pulled in I let the gang go out to cool off, while I laid out some holes for supporting it. It was necessary for me to work perched on top of a ten-foot step-ladder, crowded in between a rotary converter, supplying five hundred volts for the street railway, and the rack that held the cables.

There was a series transformer, installed near by on a marble base, for reading the current in a "white way" circuit. It carried about 2,400 volts of alternating current—and was defective. After climbing up, I was holding the cable in place when the ladder swayed and my left knee touched the transformer. My right arm was wrapped around a grounded pipe and my heart was right in the path of 2,400 volts. It happened quickly—just like that!—like falling, tripping or missing a putt.

First Mental Reactions

My first interest in the situation was purely professional. I thought—"What has happened? What circuit has gotten me? Did I slip? Did some one drop a live wire on me? Surely I knew every live wire in that place and I was nowhere near any of them. Oh, but wait a minute, I have it. Harold Nagle, the station operator, was making his noon time test and I was on the 'white way' circuit."—All this in a breathless split second.

Why didn't I pray, or think of the folks at home? Why didn't I think of the mistakes of the past, my sins and trespasses? I don't know.

The first sensation was loss of sight—not black out—but sort of a purple that was just annoying. There was no pain or discomfort—no fear. I was held as if jammed into a full clothes closet, but had no power to fight or resist or no will to do either. Maybe I tried to pull away, but, doubt it.

A buzzing louder than that of a trimotored plane filled my ears and registered the one annoying sensation. It was increasing to a point where I did not believe my head could hold all that noise without bursting. I hoped it would not burst and mess up the station.

"Boy, oh boy, how much longer can I stand this? It sure does hurt my ears. That purple is getting deeper; almost black. Can't stand this noise much longer. Hope something happens soon. Why doesn't my body pain? Now I know! That is what frequency sounds like. Sixty cycles per second, 3,600 cycles per minute, 7,200 alternations per minute. Phew! That's a lot of alternations in a minute in my head.

Passing Out

"But wait! They are becoming fainter. They do not hurt my ears so. I guess I am getting a little used up—tired and a bit sleepy. Maybe this is death coming and what if it is? It would be better than this buzzing. Why am I not afraid of this death, that is supposed to be so dreadful? Well, I don't care about death, as long as this buzzing is becoming less intense and it is! I can hardly hear it now. There! It is going—going—gone—and all is black."

These were my thoughts—my sensations during the seven seconds they told me I was in the circuit. Nagle saw the flash and heard the sound that all station men dread. A thin wisp of smoke rose from my body as it was drawn up and off the top of the ladder. Then the strength of the current was overcome by my weight, when it drew my legs up, and Nagle was horrified to see me fall right for the commutator end of the rotary converter. I missed it by a fraction of an inch and fell an inert mass on the floor.

The doctor was right next door on Albany Street. Some one ran for him as soon as Nagle gave the alarm. He was in the station by the time they carried me to the rear where there was fresh air. He examined me there on the floor and found I had no heart action, no pulse, no respiration. I was just plain dead and he announced that he could do nothing for me.

Joe to the Rescue

The company foremen each week practiced artificial respiration, with all men taking part. Joe Collins was a big, strong, young fellow who worked havoc on any prone form laid out before him for training. Am I glad that he took this so seriously and was so powerful!

When the doctor declared me dead Joe went to work! He layed me on a horse blanket. He put a wooden clip on my tongue to keep me from strangling. He turned me face downward. My whole body was a blue-green color now. Joe put his two big hands above where my lungs should be and got going; raising and lowering his body

[Continued on page 49]

Hangers Made on the Job

Power Cutting and Punching Cut the Costs on a Large Contract.

POWERIZED SHEARING *of stock-size channels for conduit racks eliminate costly hand labor fabrication*

MANY new types of equipment must be installed these days, and the fabrication of steel hangers and frames is becoming more important in the electrical contractor's job. On very large contracts this type of work may run into big figures.

So when J. Livingston Company, of New York, tackles a job requiring hangers and brackets, they load a power operated, cutting and punching machine onto the truck and send it to the building. There it is set up at a convenient location, in charge of specially trained men. Templates and forms are standardized to a minimum number and the work organized on a production basis.

A shearing knife, cutting to $\frac{3}{8}$-in. stock, operates at one end of the machine and a punch at the other. In the center, interchangeable jigs allow special shapes to be cut without distortion —1 inch square and round rod, angles to 3 x 3 x $\frac{1}{4}$, T forms up 2 x 2 x $\frac{1}{16}$. Many sizes of channels are cut with one shear. The machine is driven by a 2 hp. 220-volt, single phase motor controlled by a magnetic starter. Push-buttons are placed at both ends for convenient operation, and are accessible from any working position.

Where the amount of cutting and punching is sufficient to warrant its use, the saving in man hours quickly justifies the investment in the machine, according to this contractor's experience. In many cases, where a time limit must be observed, it becomes essential to getting the work done on schedule and at a profit.

(ABOVE) SAFETY PLUS ACCURACY *is assured, as several sets of jigs and guides take care of various structural shapes used in racks and hangers.*

(LEFT) HOLE PUNCHING *goes fast too, whether for busbars, channels or flat iron. It is but a matter of sending sketches of what is wanted to the machine operator. He works from stock and keeps the erection crews on the move.*

UMI

Testimony

Some Good Industrial Lighting Recently Installed — And What the Men Who Own Them Have to Say

DAVENPORT MACHINE TOOL COMPANY, of Rochester, says—

"Some years ago, one wing of the factory was relighted with a modern glassteel diffuser installation. The improvement in general appearance was extremely noticeable.

"Recently, an installation of H-1 mercury lamps has given the same results. Our men report that it saves rearranging local lighting units to suit the particular task, and enables them to make the necessary adjustments of the tools and the work more quickly. This naturally increases production and is appreciated by the workmen."

W. S. Davenport, *Pres. and Gen. Mgr.*

MACHINE TOOL PLANT—*Installation by plant forces—400 watt Type H-1 G-E mercury lamps and Benjamin industrial reflectors with diffusing shades—spacing 13-15 ft.—Illumination 30 foot candles on machines.*

SETTER BROTHERS, of Cattaraugus, says—

"In the manufacture of plywood sheets, the most delicate operation is the simultaneous matching of the grain and checking for imperfections. We buy long sheets, 6 inches wide and 12 to 16 feet in length. In our old plant, this work was done under drop lights with tin shades.

"The new plant is equipped with a combination mercury and incandescent system. Our workmen are enthusiastic. We are convinced that it is an indispensable aid toward insuring a quality product.

Paul A. Setter, *Vice-President*

PLYWOOD FACTORY—*Installation by H. P. Niesen, contractor 250-watt G-E mercury and 300-watt Mazda lamps in Ivanhoe glassteel diffusers, irregularly spaced—Illumination 30 foot candles.*

FRONTIER ENGRAVING SERVICE of Buffalo, says—

"One of our operations is 'masking,' which requires painting lampblack on cellophane. This is an exacting task which gave our artists headaches. A survey indicated that lighting conditions were poor. A carefully designed system was installed, which produced approximately 100 foot candles on the easel.

"Our men are enthusiastic. It is comfortable, because of the elimination of annoying reflections. This permits faster work. Most important of all, the men say—'Now we don't go home half blinded at night.'"

T. Heath, *Manager*

ENGRAVING SHOP—*Installation by E. J. Doer, contractor, 150-watt Mazda lamps in Miller Suplites and 200-watt lamps in Ivanhoe R.L.M., domes, spacing 4 ft.—Illumination on easel 100 foot candles.*

UMI

MARRIOTT'S FRENCH DRY CLEANING WORKS, of Rochester, says—

"In cleaning clothes good seeing conditions are necessary, particularly in the final inspection. When we moved, we installed a thoroughly modern lighting system.

"The number of returned garments is now about one-tenth what it used to be. Our rate of production has increased 24 per cent. A third of this increase is attributable to improved lighting.

"In the old plant bare lamps were suspended on drop cords. Employees complained of headaches. These complaints have now stopped. Morale has improved."

R. A. Marriott

DRY CLEANING PLANT—*Installation by Hegnauer Bros., contractors—300-watt Mazda lamps, in Benjamin glassteel diffusers over line of ironers—Illumination 30 foot candles.*

BASTIAN BROTHERS COMPANY, of Rochester, says—

"Six months ago, we began to install improved lighting in our plant. Complete rewiring was necessary, and is still going on. From the day the first section of the factory was relighted, those who already had the new lighting have expressed their satisfaction and those who are still working under the old lighting system have been highly impatient to have their sections of the plant relighted. If the improved lighting should bring us no other tangible benefits, it will be well worthwhile."

F. A. McDermott, *Superintendent*

CELLULOID NOVELTY WORKS—*Installation by plant forces—300-watt Mazda lamps in Benjamin glassteel diffusers, spacing 8 ft. by 10 ft.—Illumination 23 foot candles.*

J. & A. KELLER MACHINE COMPANY of Buffalo, says—

"We operate a machine shop employing only 14 men. The work is exacting and mistakes are costly. We recently relighted and repainted the shop, and find that the men are more alert and the problem of accident hazard has been solved. The men can make adjustments and settings in a fraction of the time formerly required and mistakes formerly made because they could not see well should no longer occur. It is too early to tell the effect on production but we expect a worthwhile improvement.

Joseph Keller

MACHINE SHOP—*300-watt Hygrade white bowl lamps in Goodrich R.L.M. dome reflectors, spaced 10 feet apart and Fostoria Pressed Steel ball jointed local lights—Illumination 20 foot candles—Installed by Stearns Electric Equipment Co.*

AETNA RUBBER COMPANY of Cleveland, says—

"Our improved lighting has been uniformly successful. In our battery case molding room, our men did not like to work on the night shift. Since relighting, we have had no more complaints. The factory is much more cheerful and safer to work in.

"Also, formerly, the greater amount of scrap occurred at night. Now it is the same amount both night and day, and the overall spoilage has decreased 30 per cent. Night production has increased too, until now it equals day production."

E. J. Malek, *Plant Manager*

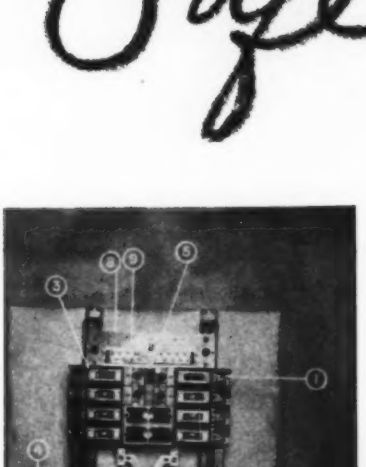
RUBBER PLANT—*200-watt lamps in Benjamin R.L.M. dome reflectors—spacing 7 feet, illumination 15 foot-candles—Installed by plant forces.*

UMI

Safe Circuit Breakers

By H. B. Smith

Associate Electrical Engineer Underwriters Laboratories, Inc., New York



TYPICAL ASSEMBLY OF APPROVED BRANCH-CIRCUIT-BREAKERS AND MAIN BREAKER IN A DISTRIBUTION CENTER

1. Labeled, branch-circuit, circuit-breakers, single or double-pole.
2. Labeled, main circuit-breaker. Where only main lugs are supplied, a cover the same as over neutral is used.
3. "ON" and "OFF" markings incorporated in or placed on breakers.
4. Moulded-composition cover used over neutral bus and main lugs when used.
5. Double wire-mesh barrier closes gutter space between the two rows of breakers. Barrier not used at opposite end unless main lugs are provided.
6. Sheet-metal channel alongside of main breaker, completely closes sides.
7. Sheet-metal cover, No. 16 U. S. S. gauge.
8. One-eighth-inch phenolic-composition support for neutral; 1/32-inch fiber strip placed under support.
9. Neutral bus, copper, with terminal screws and cupped washer for branch circuits. Each terminal numbered. Bus riveted to phenolic-composition support.

How Branch-Circuit and Service Circuit-Breakers are Guarded by Construction and Performance Standards. What Makes them Safe?

EVEN when an electrical installation shows the best possible workmanship, with wire, fittings and equipment approved as to fire and accident hazards, trouble and perhaps tragedy may result if all is not well with the automatic over-current protective devices employed. Excess current is practically synonymous with overheating, and continuous overheating generally means a breakdown of some kind or a fire. Accordingly, it is impossible to over-emphasize the need for protection against dangerously heavy currents.

The National Electrical Code recognizes fuses and circuit-breakers as acceptable devices for automatic over-current protection and specifies how they are to be installed. But there may be trouble if fuses and circuit-breakers are misused or abused or tampered with. And tampering with the adjustments of these safeguards is criminal.

Design and construction of both fuses and circuit-breakers are covered by standard requirements which specify the essential features of performance. Both classes of devices are supervised under the Laboratories' Factory Inspection and Label Service Program. For though fuses have been familiar devices at services for many years and at distribution centers for the protection of branch-circuits, the introduction of circuit-breakers for these applications is new.

For Branch Circuits

The most common branch-circuit-breakers are those rated at 35 amperes or less, although they are not restricted to this rating. Service circuit-breakers are generally higher in rating and may go as high as 600 amperes. These uses of circuit-breakers have lead to the development of requirements which differ somewhat from those which existed previously for power circuit-breakers, and some of the essential features of branch-circuit and service circuit-breakers are worth studying.

For example, all of these breakers must be reset manually after they have tripped and they are required to be "trip free from the handle." This is a very important feature and insures that a breaker cannot be held closed under overload conditions which have released the tripping mechanism. Accordingly, a breaker closed on a heavy overload will immediately trip out, even though the operating handle is held "on." Practically all of these breakers are designed so that they can be opened by hand, in addition to the automatic tripping, as a manually operated switch.

To Prevent Tampering

Prevention of tampering has been recognized as one of the most important features in connection with circuit-breakers. It is almost impossible to make these devices absolutely foolproof, but care has been taken to specify a construction which will make tampering difficult. A circuit-breaker must not be capable of being rendered inoperative, or thrown out of adjustment from the outside of the device without damaging the enclosure or parts designed to close the openings in the enclosure. Access to the release mechanism, and for a breaker rated at 35 amperes or less, interference with the calibration or the automatic operation of the breakers requires dismantling of the device or the breaking of a seal.

The action of a circuit-breaker may be instantaneous at any particular current, as when a magnetic trip is employed; or it may be slower—with a time lag—when an inverse time element is employed, depending upon the heating effect of the current. For branch-circuit and service protection, the latter type is used almost exclusively, and these breakers have such operating characteristics that the higher the current carried, the more quickly they trip. At very high currents they are instantaneous.

A circuit-breaker which trips out at

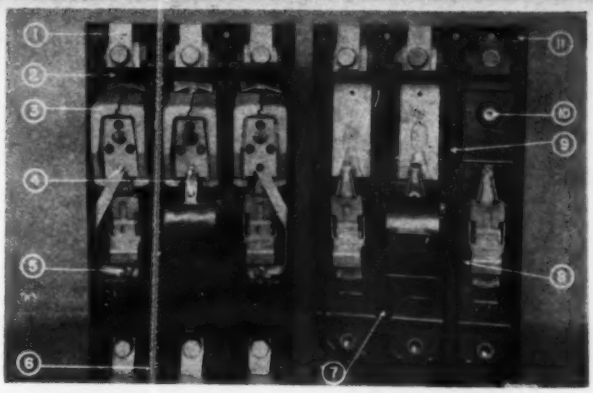
currents lower than its rating would be quite unsatisfactory, in fact, it would be a nuisance. Accordingly, each breaker is required to be capable of carrying 100 per cent of its rated current indefinitely. When so tested, a check is made of the temperatures attained on various parts of the breakers in order to eliminate overheating of materials beyond the temperatures for which they are recognized. Then, to insure acceptable protection under overload conditions, the calibration of a breaker is checked to determine that tripping will occur within a specified time at 125 and 200 per cent current. A 35-ampere breaker, for instance, is required to trip within one hour at 125 per cent, in two minutes at 200 per cent current.

Safety and reliability of operation under service conditions are checked by means of overload and endurance tests. The former involves 50 cycles of operation at 600 per cent current, while the endurance test for breakers rated up to 225 amperes, involves 4000 to 6000 cycles operation at rated current, plus 4000 purely mechanical operations without current. Following these tests, the calibration of a breaker is checked again at 125 and 200 per cent current.

The most severe test comes when a breaker is operated under short-circuit conditions to determine that it has adequate rupturing capacity and that it is not a fire hazard when so operated. Single-pole and multi-polebreakers are subjected to three operations per pole on a test circuit, which has a capacity of 5000 amperes for breakers rated up to 100 amperes and 250 volts and 10,000 amperes for breakers rated at more than 1000 amperes or more than 250 volts. The breaker must be in operating condition after the short-circuit test, and this is determined by rechecking the tripping time of the breaker at 200 per cent of its rated current.

Finally, in the test program, a breaker is subjected to a dielectric strength test consisting of the application of a 60-cycle alternating potential of twice its maximum rated voltage plus 1000 volts. This insures that the insulation and spacings of the breaker have an adequate margin of safety.

Then in addition to these tests a breaker must comply with certain definite requirements relating to construction details, rating and marking. Altogether, a circuit-breaker listed by Underwriters' Laboratories, Inc. is reasonably certain to be satisfactory in service. And as an additional safeguard, after a breaker is listed, it is rechecked quarterly and subjected to annual short-circuit tests under the Factory Inspection and Label Service.

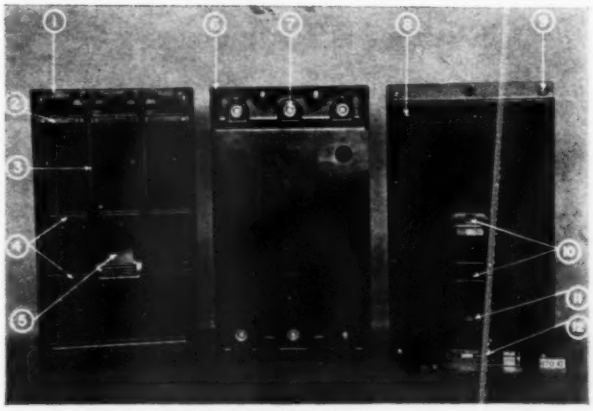


MECHANISM OF AN APPROVED 225-AMPERE BREAKER

1. Terminal lugs—Do not extend beyond case.
2. Barrier—fiber 1/32 in. thick, 2-5/16 in. wide, 2-3/8 in. long. Two rivets.
3. Arc structure—600 volts ac, 250 volts dc type.
4. Screws—No. 10-32 plated steel. Lock washers. Secure "arc conductors" on 600 ac—250 dc type.
5. Screw—3/8 in.—16 plated steel. Lock washer. Secures "arc conductor," flexible shunt and trip unit terminal.
6. Mounting screw hole—deeply counterbored. Four provided.
7. Barrier—3/8 in. wide, 5/16 in. high.
8. Shaft—1/2 in. square steel, in phenolic composition.
9. Barrier—5/16 in. wide, 2-1/4 in. high.
10. Insert—No. 14-24, for screw holding contact-terminal.
11. Insert—No. 10-32, for cover screws.

ENCLOSURE OF APPROVED 225-AMPERE BREAKER

1. Cover—rear view. Phenolic composition approximately 1/4 in. thick. Side walls 1-1/2 in. deep, 1/4 in. thick.
2. Barrier—1-1/16 in. high, 1/4 in. thick.
3. Barrier—5/16 in. thick, 3 in. centers.
4. Barriers—5/8 in. high, 1/4 in. thick.
5. Handle opening—2-3/16 in. by 1-19 32 in. Grooves top and bottom.
6. Base—rear view. Phenolic composition 15-1/2 in. long, 9 in. wide, 2-9/16 in. high. Rear wall 1/4 in., side walls 7/32 in. approximate minimum thickness.
7. Brass insert—moulded in base, not less than 1/2 in. from mounting plane. For 1/2 in.-13 lug screw.
8. Enclosure—front of cover ribbed. Overall depth 4-15/16 in.
9. Assembly screw—one per corner. Recessed. Lock washer.
10. "ON"—"OFF"—moulded. White line on handle segment also indicates "On" position.
11. Ampere rating—"Amperes" moulded in cover. Rating on trip unit shows through cover.



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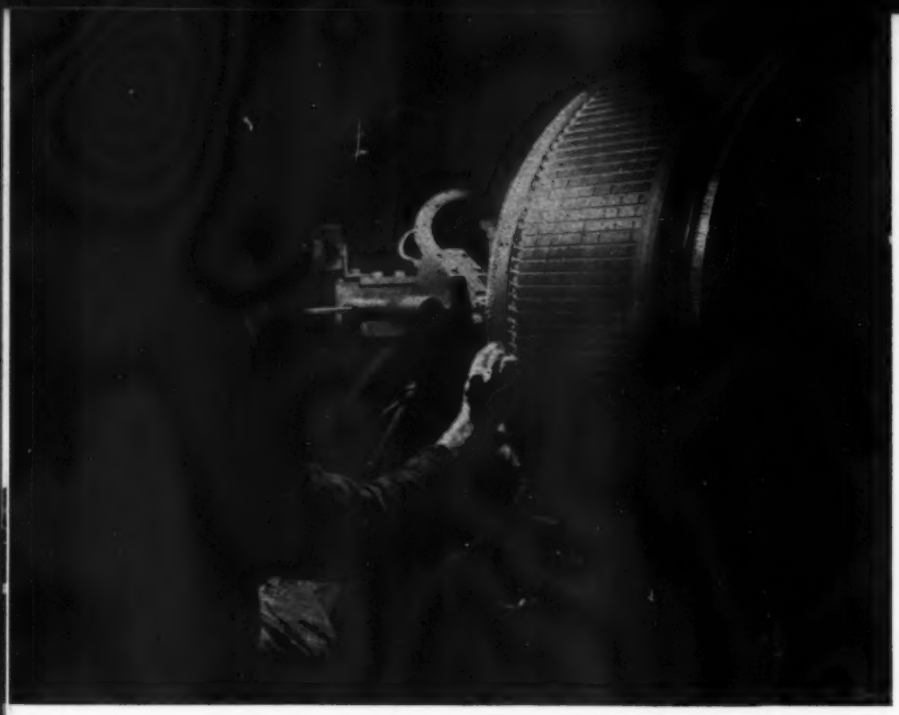

SILVER SOLDERING *armature connections at the Westinghouse works.*

Shops *of the* Future

By Frank J. Seiler *

Associate Editor, Electrical Contracting

ARE the service shops keeping their ears to the ground as new fields of electrical usage assume definite proportions? I refer to industrial modernization, rural electrification, air conditioning, commercial refrigeration, the all-electric home, and electronic developments. For example:

In 1936 there were about 5,000 installations of air conditioning, and 1,600 of these were made in homes. The domestic and rural motor service field also looms steadily larger.

Will alert service shop management step into these new fields, or will this work filter its way to newly-created service agencies because of our disregard for it?

The scarcity of skilled mechanics is causing grave concern to many industries. It is but a matter of time when the shop industry will also begin to feel the pinch. Here are some possibilities to consider:

(1) A community interchange of experienced help to meet fluctuations in the shop payroll.

(2) Practical and equitable rating plans, by which to grade mechanics for advancement and for interchange in a community.

(3) Local cooperative schools for service men, to keep them up to date in all vital aspects of new developments, that concern their department.

(4) Ways to departmentalize shop operations, so as to shorten the training interim for newly recruited forces.

(5) Female workers in the shop. Are they practicable? In which type of regular year-round business can they be used? How does their production compare with that of male help?

(6) How will bonuses or sales commissions improve employees' interest and reduce employee turnover?

Closely related to employee relations and efficiency comes the matter of managing the shop routine. New views are unfolding in modernized shop procedure. It has been found cheaper and mathematically safe to estimate the labor and materials for certain types of reconditioning work rather than to be burdened with detailed requisitioning and pricing costs. This budget system of work control, also reduces clerical mechanics to a mere check-off procedure. It furthermore eliminates waiting at the supplies window.

One large shop prepares exact piece-by-piece specifications of the winding materials, for a wide range of motor sizes. So in this shop an office record system prescribes the entire job requirements, and beginners can work up the pieces at the cutting shears. The more expensive mechanic, meanwhile plies his skill and does not spend needless time at such elementary work.

Again, the standardization and levelling off of work flow has interesting possibilities. By this is meant the gradual setting up in stock of spare replacement units. This applies to armatures and stators, that fall into a particular shop's run-of-the-mine sizes. Quite a few shopmen have told us of their plans to build up stocks of large spare stators. Whether or not this is a pleasant subject, it is something our service shops should face cooly and without prejudice. It may help to cut down the high overhead and general interruptions that go with rush and overtime orders. It may also keep business at home.

Other problems to consider are: (a) Re-sale of shop supplies and apparatus. (b) Service depots. (c) Non-electrical services on equipment, such as pumps, compressors, power drives and gears. (d) Instrument surveys, appraisals, layout and efficiency tests.

Selling the Shop

To do all or perhaps any of these things, however, will be of little help so long as the management is not also streamlined in its selling relations with the buying public. Those who are inclined to consider themselves as being superior mouse-trap makers, had better come to. A reputation for quality is important, but in this age of eye and ear appeal, of broadsides and broadcasts, there is little chance for the meek and modest in business.

So shops, too, must sell their wares. That means sell their experience, their equipment, their prestige in the community, and to do this they must humanize or dramatize the nature of their services. This needs original ideas in handling customer inquiries, in handling complaints, in the preparation of advertising, and in devising an attractive package for the product—meaning your nameplate. Neat employee uniforms also make a fine impression.

It pays to put your house in order for visitors for they come oftener than you realize. Use every inch of available floor space and every penny's worth of displayable apparatus most effectively. Old shop machines look more efficient with a glossy coat of bright enamel. You do it with gratifying results to some terribly "spavined" motors now and then. Why not try it on your workshop. It is showmanship and does not cost much.

* *Abstracted from an address before the N.I.S.A. Convention, Chicago, Ill.*

The Lady Needs More
... ELECTRIC OUTLETS
● Now is the time to modernize your electric facilities. Three outlets can be installed in one home or apartment for only $4.75 each. Terms are as low as $1.43 down, the balance payable in small monthly installments.
For a complete modernization job, install an adequate number of outlets to meet today's standards and replace old fixtures with new, modern types that will improve
IT'S NO USE!
Why Not Install More
ELECTRIC
OUTLETS
now at Low Cost!
● Do you play tug-of-war trying to make connections? It's no longer necessary. AddHere electric outlets can be installed inexpensively and quickly in your present outlet without cutting into walls. For complete informa-
Call RANdolph 1200, Local
5 Double
AddHere Electric
Wall
Outlets
$1

They're Out For 2,300,000 Outlets

A check-up in the Chicago Cooperative Outlet Campaign—Still Going Strong

CHICAGO has had an organized outlet campaign running for many years. Prior to 1918 the Commonwealth Edison Company operated a large staff of salesmen, calling on homes in the Windy City, selling more receptacles, lights and switches. During the last year of this period the power company sold close to a million dollars in wiring and half a million dollars worth of fixtures and installed them themselves. Then they quit.

In 1928 the company organized a new campaign to sell more outlets in under wired homes. But this time they employed a staff of three supervisors and 50 salesmen and started an advertising campaign, but cleared all the wiring through the Electrical Contractors Association of Chicago. It is still rolling—and the record is interesting. Oliver Hogue, manager of lighting and wiring sales for the Commonwealth Edison Company, told the story in part to the NECA convention in Atlanta last October. Here are some further facts on the present situation.

The scale of this operation since 1928, is indicated by the following record of outlet sales. The figures are impressive—

1928 (6 mos.)	26,300
1929	45,600
1930	48,600
1931	33,200
1932	13,200
1933	8,800
1934	10,800
1935	12,600
1936	9,452

The 1936 sales included 6,279 convenience outlets, 2,478 lighting outlets and 695 wall switches, in all 2,959 wiring jobs. In money these wiring sales totalled $72,050. Resultant fixture sales totalled $26,504, for 5,416 fixtures, sold in 2,763 jobs.

Right now there are 30 salesmen selling outlets. They are using "Adhere" as bait, offering three of these extension surface outlets for $14.25, with terms as low as $1.43 down and a dollar a month, not longer than 15 months. They started offering these Adhere outlets last August and sales picked up at once from 35 to 40 per cent. The bargain aroused interest and got action, but only 831 adhere outlets were sold in the balance of the year. When it came to

Modernize Now at Reduced Prices

ELECTRICITY can be of the most use and benefit to you, if your electric facilities are up-to-date. Now is the time to modernize your home electrically. We will install 3 electric outlets in any home or apartment for only $4.75 each. On terms as low as $1.43 a month.

Also, you can purchase attractive new lighting fixtures at reasonable prices. Replace old types now and improve the lighting and beauty of your home. We will be glad to help you solve any electric modernization problem, without obligation.

Commonwealth Edison Company
72 West Adams Street
Telephone Randolph 1200, Local 547

It's Time to Modernize ELECTRICALLY

● Every room in the home should have enough electric outlets for working and convenience needs. Get them now at reduced prices. 3 outlets, installed in one home or apartment, only $4.75 each. Terms as low as $1.43 down.

Check your lighting fixtures, too. New, modern types are greatly improved in appearance and much more useful. They can be had at reasonable prices. Ask us for any information concerning electric modernization. No obligation.

Commonwealth Edison Company
72 West Adams Street
Telephone Randolph 1200, Local 547

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giving the order, most of the work was done concealed in non-metallic sheath cable, at prices little higher.

This work is allocated to contractors located in different sections of the city. And at present five men are specializing in it and doing all the work. Their business is taken at the regular schedule of prices, listed in the accompanying schedule. But this volume sold in the campaign, is bulking only about 15 per cent of the business that is actually resulting from the advertising and selling that is being done. At least 50 per cent of it is going to the small "vest pocket" contractor for $3.00 an outlet or less. Some small contractors are selling outlets under a wall switch or fixture for $2.

Good Salesmen Scarce

The biggest trouble they have had has been to get good salesmen and to hold them. They began by paying a straight commission of $1 an outlet and the contractor provided 10 per cent of it. The Commonwealth company pays the full commission on all Adhere jobs. They now give the men a drawing account so they can eat, and a course of training.

The average sale today is 2.63 outlets. But there are many jobs that need new circuits or changes in the service and here an estimate is made. So the average cost per outlet really runs nearer $8.50. Much of the extra work comes in the poorer class of homes, where there is more wiring to be done behind the outlet.

In all, there are 300,000 minimum bill customers in Chicago, paying 50 cents a month. They are the preferred prospects in the outlet campaign. The overall average for the city is now 2.4 outlets per major room. They are trying to raise it to three and are now out to sell 2,300,000 outlets in seven years.

Standard Approach

The selling is highly organized. The salesman has a canned patter. He rings the door bell and holds a cord and plug set in his hand. When the door opens, he asks, "Would you be interested in getting one of these?" She would or she wouldn't—and either way—he's off. Most of the new outlets sold are going into the living room and kitchen.

This installation work also has to be highly specialized. Men used to handling ordinary old house wiring are no better than any other wiremen on this job. They all have to be trained. The Contractors Association, under the direction of Walter Collins, runs classes each month to train apprentices.

LUMBER TYPEWRITER—*Unique machine that cuts off edges, die stamps and inks each plank in a big mill in the northwest.*

"Paul Bunyan's Typewriter"

A direct drive finisher for dimension lumber, without a duplicate in the United States.

By Kenneth Watts,
Chief Electrician, Weyerhauser Mfg. Co.
Everett, Wash.

TO provide a super-service to users of lumber, the Weyerhauser Manufacturing Company developed a guide-line trimmer which delivers perfectly conditioned wood in frame dimensions, stamped in ink with dimensions and/or grade, and end-labelled in black with the "Four Square" trade-mark. This stamp device is called "Paul Bunyan's Typewriter", and the name hangs on a placard above the delivery side of the huge machine.

This trimmer must put out a product which is sawed exactly square at the ends, and die-stamped in feet and inches its entire length, like a giant ruler. Also, the management decided on producing "eased edges", or semi-rounded corners, to make this class of product more attractive to handle.

Lumber is taken from the end-of-the-line rollers shown in the picture, and fed to an aligning rack which releases the planks a piece at a time to a multiple-chain conveyor. This puts them through the cut-off saws—operated at 3,600 rpm., direct drive—and through the edging, die-stamping and inking devices; the latter being applied as the material leaves the down-hill discharge side of the machine.

There is complete provision for ventilation and waste. Power is applied direct to the integral units, and properly synchronized. One 2 h.p. motor is used in shifting the planks. A 1 h.p. motor drives the conveyor belt taking away refuse. There are two saw motors, of 5 h.p. each. The feed motor is 15 h.p., with two auxiliary eights and three fives, of three and four speeds. Twin blower lines take care of all light refuse. For lighting we employ two 100-Watt tungsten blue bulbs on either side of the machine, with fair auxiliary window lighting in the day-time.

As an ingenious method of applying current largely manufactured from hogged fuel, the machine requires no apologies to the tradition of Paul Bunyan, the Magic Giant of the North Woods.

THE NEW SALES APPROACH TO INDUSTRY

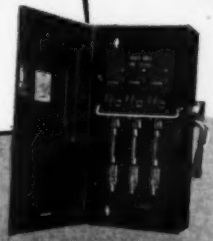
When a factory gets busy — when orders pile up and delivery promises begin to crack—there's a big change in the way that factory buys equipment. Buying on price is out.... Idle factories do buy on price, but busy factories buy for quality. They want good, dependable equipment that keeps them running.

The new sales approach to Industry that gets business today and builds satisfied customers for tomorrow is quality. Feature Cutler-Hammer Safety Switches and see the difference. CUTLER-HAMMER, Inc., Pioneer Manufacturers of Electric Control Apparatus, 1306 St. Paul Ave., Milwaukee, Wis.

CUTLER-HAMMER

SAFETY SWITCHES

C-H



The famous C-H Type A Mill Duty Switch (Cat. No. 4101) is the perfect answer to the present demand for equipment of utmost dependability. The C-H Factory Duty Type A Switch (Cat. No. 4115) shown at the right provides this same reliability in an extremely compact design.

August EDITORIALS

Earl Whitehorne . . . . . Editor

What High Prices Actually Accomplish

Many a business man is worrying right now because prices keep going up, and competition is growing keener and he seems to be squeezing in the middle. He can't figure out how he can keep on making a profit, if these conditions get much worse. But if he will look further he will see the answer.

Today's recovery movement is born of three forces—1. The national expansion of business, starting with low prices and the national pressure of demand to fill shortages; 2. Artificial stimulus to business by government pump priming, totalling more than $8,500,000,000 since March 1933; 3. The world wide armament race that this year will exceed the expenditures of 1929 by $7,000,000,000. So demand grows and prices rise.

At the same time, there are three other forces that are actively restricting profits on this increasing business—1. Swiftly rising raw material prices; 2. Swiftly rising labor costs, due both to skilled labor shortage and to the greatest militant labor drive in history; 3. Greater obsolescence in buildings and equipment that cause unnecessarily high production costs. So every manufacturer feels an urge to raise his prices and pass them on to the public.

But there are three obstacles in the way of this, under the American system of free competition—1. Fear of direct competition—that his competitors may raise their prices less or not at all; 2. Fear of industry competition—that if an entire industry raises prices, the public will turn to some substitute—oil instead of coal, or castings instead of stampings, for example; 3. Fear of the right to buy less—just plain old fashioned customer resistance. And so we are protected by these obstacles and can count on a natural limit to the rising wave of general price advance.

In other words, rising prices do not bring disaster. The natural action of economic forces corrects the trouble-making trend. Then prices stop going up and adjustments come to compensate for them.

After all, there is only one way that any business man can be sure of protecting his earnings and that is to keep his prices *down* and his profits *up*. Therefore, throughout American industry today there is a vast campaign in process to reduce production costs and to increase capacity by improving efficiency. That is the only way anybody has to offset higher current costs. And the combination of everybody's endeavor in this direction is the best brake on high costs that we could ask for.

All this, of course, applies to the contracting business as well as to the manufacturer for the contractor can also control his prices to a degree and can protect his profits by reducing costs. He can use this corrective for peace of mind and a practical purpose.

What are *you* doing right now, to improve your production by better methods and equipment, so that your prices will not go up unduly and reduce your sales? Have you really made a study of it?

Welcome!— Fool Proof Fuse

All electrical men will rejoice that the non-tamperable fuse plug is now actually on the market. It brings the realization of a sound idea, long hoped for but long delayed by technical difficulties and political obstacles. As the product of three prominent manufacturers, it is well launched and should win rapid acceptance in the industry. Others will follow.

It is a mockery that criminal tampering with fuses should have been permitted to continue so long. For fifty years the use of electricity has been made progressively safer. System design, mechanisms, insulation have been steadily improved. The fuse itself has been made more sensitive, more dependable. Whereupon the heedless consumer, unimpressed with the hazard involved, has continued to nullify the whole safety structure with which he has been protected, by putting a penny under the blown fuse. To save a few cents and the trouble of replacing, he has invited fire and casualty into his house—and too often the invitation has been accepted.

We can not separate a fool from his folly. But we can and should remove all possible hazards from the path of ignorant and irresponsible customers. Because we do know the threatening dangers, we have a responsibility to safeguard the public, in spite of themselves—as well as to protect the good reputation of electric service.

The 1935 National Electrical Code carried a definite requirement that non-tamperable, interchangeable fuses be used after July first of this year. But there were so many problems involved in obtaining this highly desirable feature of interchangeability that the new code, to be released this fall, has compromised and will permit but not require the use of non-tamperable fuses. And

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the matter of inter-changeability is dropped entirely.

But that should make no difference to the electrical contractor. The new fool proof fuses now made by these three manufacturers are interchangeable. As other manufacturers add the non-tamperable line, theirs too should be inter-changeable with others on sale. For it would be a pity to confuse the public and to embarrass the whole industry with such a lapse from the proven principle of standardization. And whether the code says "must" or not, these fool proof fuses should be adopted immediately. Experience may improve the fuse, but we can start now.

If they prove successful—of which there is no reason to doubt—they will come into universal use, because an idea as important as this one, will in the end prevail. The contractor should speed their general application by actively installing them in every new job, and selling them to all old customers. It is a logical fulfillment of the original effort to make these installations safe.

Why Kill More Men?

Down at Miami Beach the other day a man was using a 110 volt electric saw. He stepped into a puddle of water and dropped dead. They say 110 volts should not kill a man. Maybe this unfortunate had a weak heart. Anyway he is dead. So the question arises once more—Why don't we attach these portable tools with three wire cord and have them continually grounded?

On many building jobs these days a temporary service is installed for saws, drills and small motors, to be used during construction. It may be either a two-wire or a three-wire service, with a meter and a receptacle mounted on a post and grounded. But the saw or drill that is plugged in carries a two wire cord and it is not grounded. A separate ground wire can be attached but that gets in the way and makes the tool harder to use and the mechanic soon tears it off.

The contractor who runs the service knows that the saw should be grounded. But the manufacturer turns it out that way. It is approved by the Underwriters. And when the customer is asked to tear off the original cord and substitute a hundred feet of three wire rubber cord at twenty cents a foot, he thinks the contractor is just trying to milk him.

The man in Miami is dead. Should we go on installing these temporary services for other men to risk their lives on? Until the manufacturer provides the grounding, there is just one thing for the conscientious contractor to do. He should include the cost of a new grounded attachment cord in the price of the service.

He should frankly tell the customer why—and refuse to risk it otherwise. Already in Miami the inspectors plan to insist on permanent services which would make even more cost—all wasted—still without achieving safety.

Let's Try Some Changing

When Old King Canute told the tide not to come in, he got his feet wet and it served him right. He took himself too seriously. But he was not big enough to stop the ocean, when it got rolling—and neither is the electrical contractor.

But the contractor too has been sitting for some time in his imaginary throne, down on the beach, with his crown cocked over one eye, trying to tell another tide what to do. And he'll get his feet wet too if he waits there long enough. He is telling the changing times to let him alone—to let him go on wiring buildings the way he likes. But it can't be done.

Most contractors have elected to follow a regular course—to install only rigid conduit, or to work only in armored cable and to get the largest possible profit from each job. That is natural enough. But as jobs have been getting scarcer, through the depression, and competition keener and profits less, the thing hasn't worked out. The average customer has not been buying wiring for homes or stores or offices, and now the nation is full of under wired buildings of every class—including factories—all suffering from tight wires.

This log jam in the wiring market—just to mix the metaphors—will not be cleared away by those who work only in the old way. There will have to be a new approach, a new policy, keyed to the customer. And some contractors will have to become a bit more liberal as to what they are willing to do. Perhaps they will have to recognize all wiring methods that are approved and use the one that fits the location and the building. Perhaps they will have to reorganize on the basis of doing more jobs at a smaller profit and make more money on a larger volume.

It is all debatable. Perhaps nobody knows. But one thing is pretty obvious and sure. This vast waiting mass of re-wiring business is going to be done, one of these days, by somebody. And it will likely be some chap who tries something new and finds the way.

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Methods of other CONTRACTORS

STARTERS MADE FLUSH

Thirteen magnetic across-the-line motor starters were to be installed in a tiled room for a new milk processing plant. The Miller-Liskey Electric Company of Hagerstown, Md. made up

SMOOTH WALLS—Cabinets, flush in vitreous tile walls, house magnetic starters grouped to minimize exposure.

flush type cabinets to house the equipment. The design leaves the push buttons accessible for quick starting and stopping of motors, and eliminates grouping these control devices on the vitreous tile surface.

Two cabinets 9 in. deep, 20 in. long and 10 in. wide were set beside a flush power distribution cabinet. Special covers leave control buttons accessible to operate without opening the covers or doors of these flush controller cabinets.

BUS BAR PRESERVATIVE

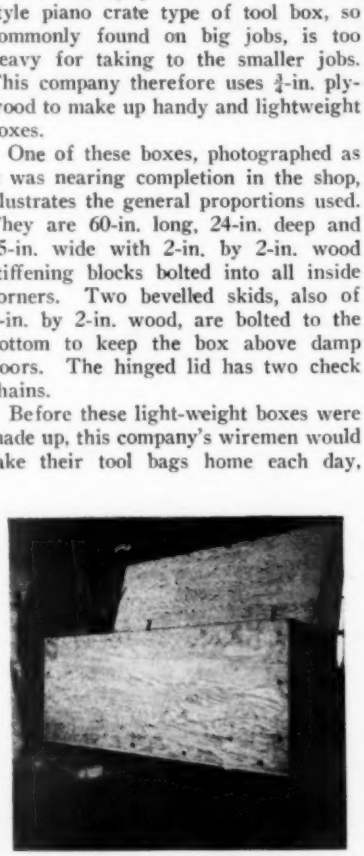
Aging copper busbars often become oxidized or "mildewed" when they are operated under adverse atmospheric conditions. To prevent this, various industrial contractors of Detroit apply a coat of aluminum paint on their busbar installations, right after the cleaned copper bars are installed. This coating with aluminum is said to last longer than an application of banana oil or lacquer. The severe use, to which bus systems are subjected in automobile plants and other Detroit industries, has caused this method to be adopted.

TOOL THEFT PREVENTION

Small modernization jobs seldom provide a safe place to leave tools and materials overnight. So the Reserve Electric Company, of Cleveland, uses light weight tool boxes to keep down its tool and equipment losses. The old-style piano crate type of tool box, so commonly found on big jobs, is too heavy for taking to the smaller jobs. This company therefore uses ¾-in. plywood to make up handy and lightweight boxes.

One of these boxes, photographed as it was nearing completion in the shop, illustrates the general proportions used. They are 60-in. long, 24-in. deep and 25-in. wide with 2-in. by 2-in. wood stiffening blocks bolted into all inside corners. Two bevelled skids, also of 2-in. by 2-in. wood, are bolted to the bottom to keep the box above damp floors. The hinged lid has two check chains.

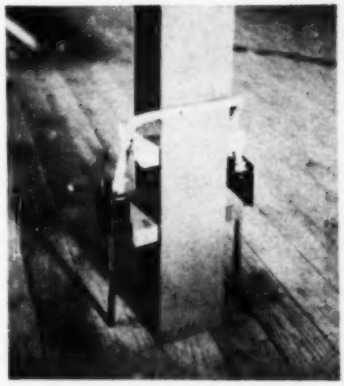
Before these light-weight boxes were made up, this company's wiremen would take their tool bags home each day, when working on doubtful premises. This still left the company's tools unprotected and several items of material and equipment were lost. The last time an $18 electric drill disappeared and it was decided to provide plenty of strong boxes for the smaller jobs.



PROPERTY SAFEGUARDED—Lightweight boxes hold tools and materials on risky modernization jobs.

LOOPING STEEL COLUMNS

Outlets that occur on opposite sides of steel columns are often a problem to tie together without making difficult bends. The Schoolfield-Harvey Electric Co., in wiring an addition to a Charleston, W. Va. furniture store, did it with short pieces of flexible steel conduit, looped around the columns between



BENDING AVOIDED—These outlets at steel columns tied together with short lengths of flexible steel conduit, save difficult pipe bending.

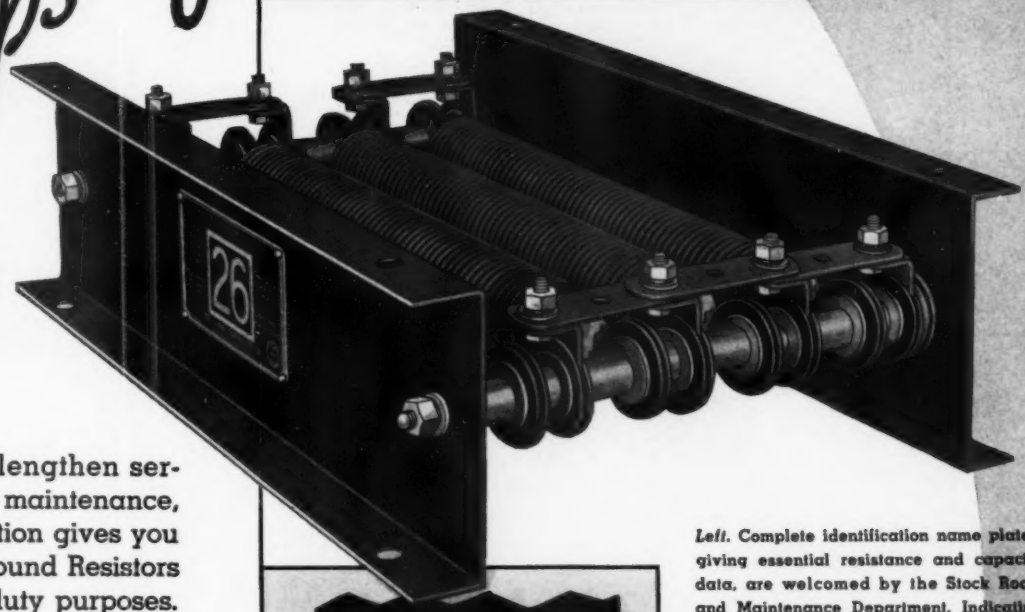
opposite wall receptacle outlets. This method reduced the wiring time and also provides a raceway for future changes of conductors.

The photograph shows ½-in. electrical metallic tubing stubbed through the floor to each outlet box at a column that is to be furred around when this floor is finished for display purposes. The outlet boxes and flexible conduit are suported on short 2-in. by 4-in. wood blocks, driven into the column webs. The blocks were sawed with a slight pitch to permit a wedged fit.

BETTER SHANTIES FOR BETTER JOBS

Here is a modern job shanty, used by J. Livingston & Company as steel-clad field headquarters, while their million-dollar Mid-Hudson Tunnel wiring contract is under way. This office is located near Manhattan's 39th Street and 12th Avenue, right at the Hudson River pier line. The famous elevated Express Highway shows at the rear, and the New York river-edge fan house is

"Taps" for Taps! ..AND OTHER CHORES



"3C" Mill Bank Edgewound Resistors are furnished in banks of standard capacities. Welded terminals are supplied at both ends of each individual unit. Intermediate taps are practically eliminated.

DETERMINED to lengthen service and lower maintenance, the Clark organization gives you Clark "3C" Edgewound Resistors for severe heavy duty purposes. • ADVANCE copper nickel alloy resistor material, cold wound on edge in cage form, not only successfully withstands shocks and vibration, but also shields porcelain insulators. • Light weight, stalwart steel channels permit the building of compact banks, yet provide full allowance for accessibility and heat-dispelling areas. • Flexibility in dimensions makes possible installation in limited space. • You're always right when you adopt Clark "3C" Mill Bank Edgewound Resistors.

Left. Complete identification name plates, giving essential resistance and capacity data, are welcomed by the Stock Room and Maintenance Department. Indicating numbering or lettering systems with large, legible figures are available to suit the customer's nomenclature or code.

Right. Welded terminals that stand up under expansion, contraction and vibration give positive, constant contacts.

BALTIMORE • BIRMINGHAM • BOSTON • BUFFALO
CHATTANOOGA • CHICAGO • CINCINNATI
CLEVELAND • DALLAS • DENVER • DETROIT
LOS ANGELES • MINNEAPOLIS • NEW ORLEANS
NEW YORK • PITTSBURGH • PHILADELPHIA
ST. LOUIS • SAN FRANCISCO • SEATTLE • TORONTO

THE CLARK CONTROLLER COMPANY
1146 EAST 152ND STREET • CLEVELAND, OHIO

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PLAN TO ATTEND!

Act to Exhibit!

NATIONAL ELECTRICAL CONTRACTORS

35th Annual Convention

and

Electrical **EXPOSITION** *Extraordinary!*

Auspices
L. A. Electrical Contractors Association

October
18, 19, 20, 21, 1937

The Biltmore Hotel • Down Town • Los Angeles

LIGHTS! ACTION! CONVENTION! . . . IN the largest, finest hotel in the West! For four days the Biltmore becomes the "House of Electricity," housing conventionites of the National Electrical Contractors Association from all over the country. Plans are already made for a record-breaking attendance!

As an added feature of the 1937 Convention, there will be an *Electrical Exposition Extraordinary* — staged under the auspices of the Los Angeles Electrical Contractors Ass'n, right in the Biltmore along with all the other convention activities. Plan to attend, plan to exhibit.

MAKE *Your* RESERVATIONS NOW

If you haven't already reserved your exhibit space, do so at once. This is a grand opportunity to display your products to every branch of the Electrical industry.

Meet the Who's Who of the Electrical World . . . see What's What in the big Electrical Exposition . . . and stay in the center of everything at America's favorite convention hotel.

SPECIAL CONVENTION RATES
$4.00 single—$7.00 double
(All Rooms with Bath)
Write or wire reservations promptly

THE **BILTMORE** HOTEL

• LOS ANGELES • CALIFORNIA •

Methods of other CONTRACTORS

(FROM PAGE 26)

hard by on the left. Raymond J. Hogan of the Livingston job clerical force lends proportion to the scene.

This temporary building measures about 15-ft. by 45-ft. It accommodates the crew lockers in a partitioned section

TUNNEL HEADQUARTERS—Steel job shanty at edge of Hudson River, houses supervising staff for big Mid-Hudson Tunnel project.

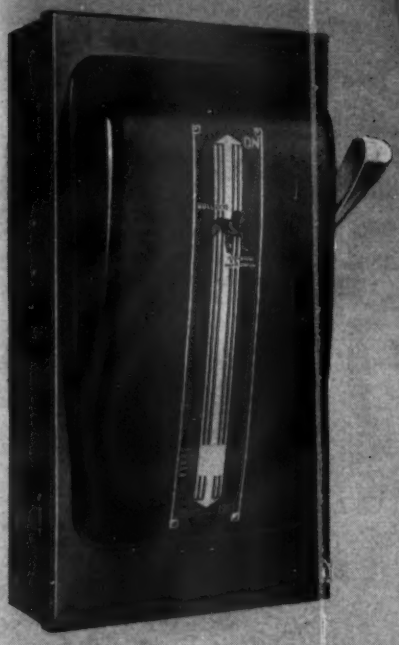
at this end, with office and plan tables in a room at the far side, a modern toilet and wash room, and a special small supplies room in the middle. The building is made of sheet steel sections and a steel frame, resting on a concrete mat. Plywood panels were installed in the office portion to provide a wind-proof finish.

TO HIDE EXPOSED WORK

The Schoolfield - Harvey Electric Company of Charleston, W. Va., had the owner build a neat temporary wood inclosure to improve the present appearance. Electrical metallic tubing was run exposed to a 36-circuit panelboard

HIDDEN PIPES—Neat temporary boxing conceals exposed work at panelboard, until the walls are finished for a display room.

The NAME **BULL DOG** IS YOUR ASSURANCE OF UNEXCELLED **QUALITY**



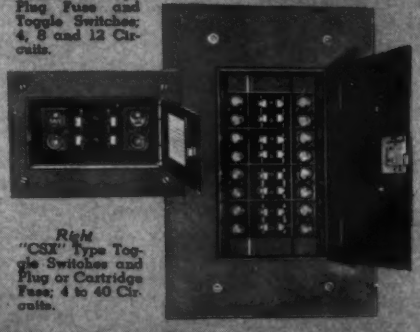
BULL DOG *Vacu-Break* SAFETY SWITCHES

Housed in compact, stylined cabinets Bull Dog VACU-BREAK Safety Switches possess every desirable modern feature. All arcing DOUBLE SEALED for complete safety . . . SOLDERLESS WIRE GRIPS for easy installation. See your nearest Bull Dog Jobber—let him prove to you the vastly superior quality of Bull Dog VACU-BREAK Safety Switches.

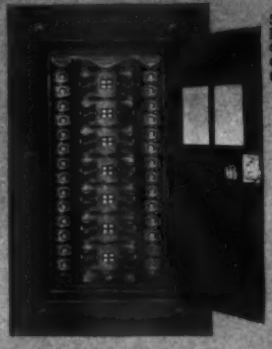
BULL DOG SWITCH CENTERS

Bull Dog features a complete line of new, economical Panelboards for general use in factories, garages, warehouses and similar buildings. The space saving NARROW COLUMN type—for installation on columns or pilasters in industrial plants and commercial buildings—is included in the Bull Dog line.

Below—"PS" Type Plug Fuse and Toggle Switches; 4, 8 and 12 Circuits.



Right "CSF" Type Toggle Switches and Plug or Cartridge Fuse; 4 to 40 Circuits.



Right—Space conserving Bull Dog Narrow Column Switch Centers for Industrial Use.

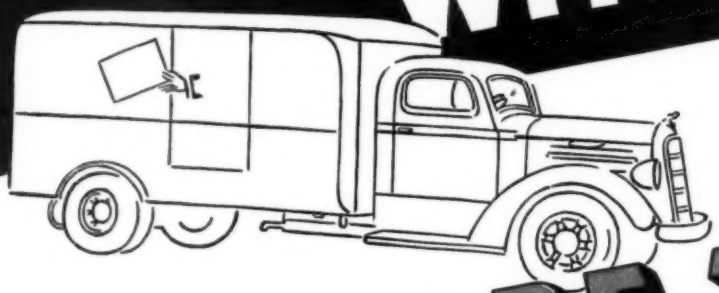
SUPERBA LIGHTING PANELS

Left—An artistic deluxe Panelboard creation. Suitable for administration buildings, office buildings and general institutions. Costs no more than Panelboards of "just ordinary" appearance.

BULL DOG ELECTRIC PRODUCTS COMPANY

DETROIT, MICHIGAN

. . . from 2 to 3 *Needless* BLOWS PER WEEK TO NONE — IS OUR RECORD WITH —



FUSES MADE TO

SAYS Mr. R. Ranger, Electrical Engineer of International Motor Co., New Brunswick, N. J.

"60 ampere 600 volt fuses are used to protect a motor which drives a line shaft that operates drill presses and grinders. Overloading of these machines was causing two to three fuse blows per week.

"In March 1933 we installed BUSS Super-Lag fuses. Since then we have not had a single shutdown caused by the blowing of a fuse."

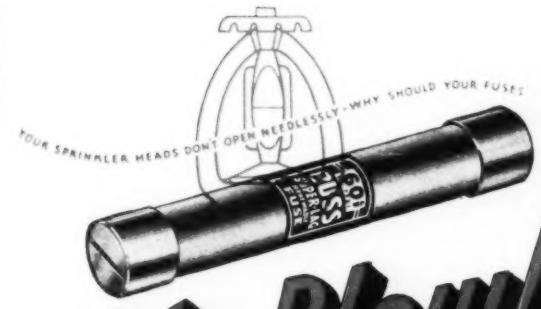
UMI

...you too, can have "POCKET-BOOK PROTECTION" as well as ELECTRICAL PROTECTION

There is nothing mysterious about BUSS Fuses actually delivering money-saving performance.

The "secret" is self-evident to any one who will examine a BUSS Super-Lag fuse and notice the simple correctness of its design and the quality of the workmanship that goes into it.

BUSS Fuses are not made just "to sell at a price." They are made to deliver safe, carefree protection—both electrical protection and "pocket-book protection."



PROTECT—not to Blow!

GET THE FACTS

Even though you may be but remotely interested in your company's earnings... you will obtain enough new information from this little book to make your suggestions on the prevention of needless shutdowns a valuable contribution.

It is replete with refreshing facts on a subject frequently receiving far too little executive attention.

A line from you requesting it will bring your copy by return mail. Ask for the book on "Fuses made to protect—not to blow."

BUSSMANN MANUFACTURING CO.
University at Jefferson • St. Louis, Mo.
Division of McGraw Electric Co.

Buss Super-Lag Fuses are available thru Electrical Wholesalers

WHY BUSS FUSES DON'T BLOW NEEDLESSLY

10 FEATURES
in the design of the FUSE-CASE help make it possible
and

The

SUPER-LAG
development in the FUSE LINK completes the job.

BUSS *Super-Lag* FUSES

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Switchfuz Switchboard . . . First National Bank . . . Tulsa, Okla.

The
"SIGN OF A BETTER JOB"

REPUTATION

REPUTATION and Quality Materials go hand in hand. . . . Both have been long identified with the visible FA trade mark which has been established for many years and recognized as "The Sign of a Better Job" by Architects and Owners in every phase of the building field.

Another reputation builder is the well known fact that you get FA material on the job when it is promised. This creates satisfied customers because it avoids aggravating construction delays and penalty losses.

You are also assured of an accurate fit of all component parts because of FA unit construction. This means a clean-cut, workmanlike job and less installation time.

Get New Catalog No. 56 . . .

It is full of helpful information, reference and engineering data, intelligently arranged so you can figure prices quickly, accurately and easily.

Frank Adam
ELECTRIC COMPANY
ST. LOUIS

Methods of other CONTRACTORS

[FROM PAGE 28]

and several adjacent outlets. A store area will be furred and panelled when this room is finished up as a furniture sales floor.

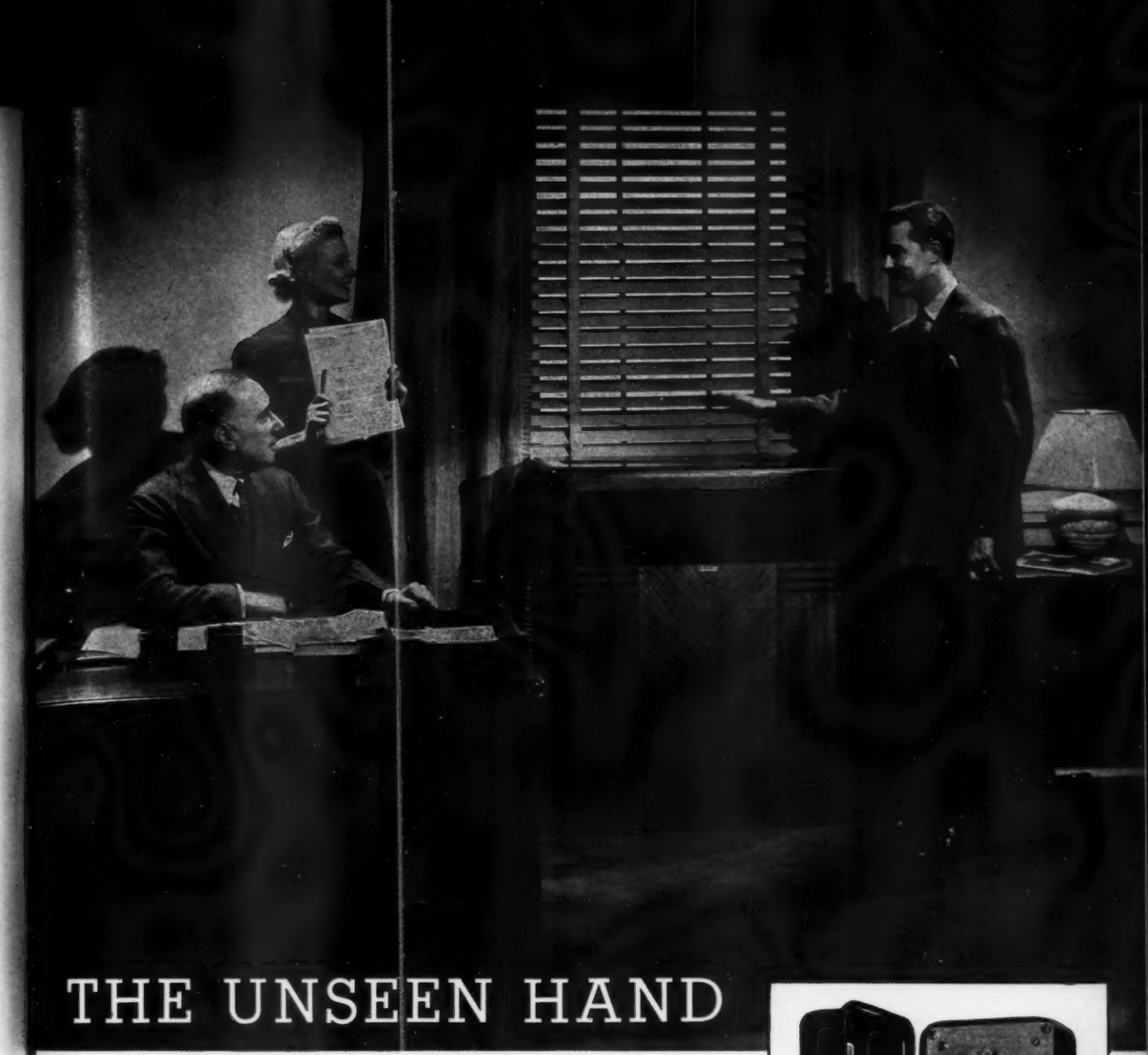
All wiring was so installed as to be flush with the future finished wall surface. The temporary inclosure was then built around the panel-board and the nearby outlets to make a tight fit. Being painted a pleasing grey color, the finished job looks like a pilaster, whereas it would otherwise have been unsightly.

ISOLATED GROUP CONTROLS

Modern store keeping calls for finger-tip, master control of window and sign lighting. In a remodelled Cincinnati ready-to-wear store, this is being done with master remote-controlled magnetic switches by the Bertke Electric Company, Inc. Valuable store space was saved by having only the master push buttons near the store entrance, and placing the panelboards and their magnetic master switches in a downstairs distribution room.

SPACE SAVED—*Push buttons at store entrance control magnetic master switches for panelboards placed in a basement room.*

The photograph shows two 12-circuit panelboard cabinets at the left for controlling alternate groups of window lighting, while the 8-circuit cabinet at the right is for circuits to neon sign transformers. Below each cabinet is a magnetic master switch. Fused switches for disconnecting the magnetic switches were set below the 4-in. by 4-in. horizontal wireway that enclosed four 500,000-c.m. main feeder cables. To the right of the remote-controlled groups are other fused feeder control switches and a 400-amp. main service switch.



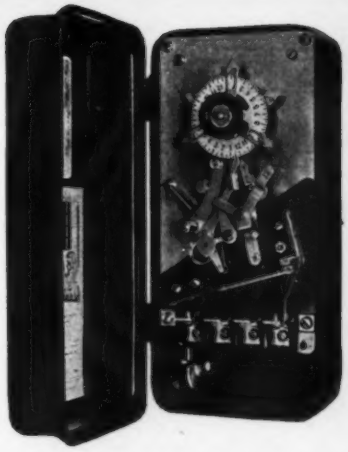
THE UNSEEN HAND

that makes

AIR CONDITIONING
COMPLETELY AUTOMATIC

NOW is the time when aggressive electrical contractors can cash in on new profits through selling Sangamo Time-Switches for **office air conditioning units.**

But . . . you must *first* call attention to the attractive savings effected, when *the unseen hand* automatically discontinues operation of the unit for the night, and resumes its function at the proper time before office hours. It will pay you handsomely to investigate this new opportunity.



Sangamo Form K Time-Switch will control A. C. office air conditioning units for daytime operation only. Other Sangamo Time-Switches are available for any required schedule of operation.

SANGAMO ELECTRIC COMPANY

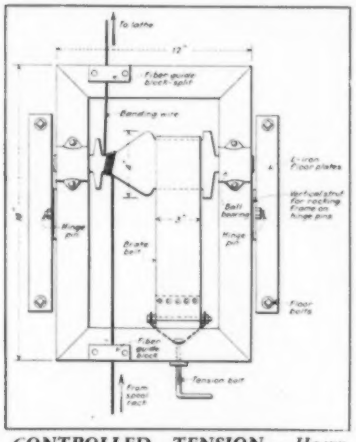
SPRINGFIELD, ILLINOIS

UMI

Among the MOTOR SHOPS

HEAVY-DUTY BANDING

When large armatures are to be banded, the Giles Armature and Electric Works of Marion, Ill. puts the desired tension on heavy wire with positive control. A specially designed cradle bracket or frame is used which has on it a tapered snubbing mandrel. The mandrel is checked with an adjustable-tension, stationary belt. The frame for this outfit rests on two struts and hinge



CONTROLLED TENSION — Heavy banding wire runs through adjustable tension device without requiring lathe operator's attention.

pins, which are fastened to angle iron plates that are lagged to the shop floor.

The mandrel was machined from a 13-in. length of 4-in. steel shafting to provide a flanged surface for the 3-in. wide checking belt, a tapered snubbing surface and a guide flange for three wraps of banding wire. The spindle or bearing ends fit pillar-block type, ball bearings.

The main frame is made 12 in. wide and 18 in. long, out of 2-in. angle iron. Split blocks of notched fibre were mounted on the frame to serve as guides for the wire feeding from the spool rack and running to the banding lathe. Since the frame rocks on its hinge pins, the outgoing wire pulls the outfit on a line with the armature's upper surface.

To utilize banding wire at its maximum tensile strength, trial runs have been made with this outfit that have broken No. 9 wire. The following table by John A. Roebling's Sons Company gives the tensile strength of medium grade, C-1, tinned steel armature banding wire, which is rated 240,000 to 270,000 pounds per square inch.

B & S Gauge	O.D.	Tensile Strength Pounds
No. 10	.1019 in.	1,957 lbs.
No. 11	.0907 in.	1,551 lbs.
No. 12	.0808 in.	1,231 lbs.
No. 13	.072 in.	977
No. 14	.0641 in.	774 lbs.
No. 15	.0571 in.	615 lbs.
No. 16	.0508 in.	486 lbs.
No. 17	.0453 in.	387 lbs.
No. 18	.0403 in.	306 lbs.
No. 19	.0359 in.	243 lbs.
No. 20	.032 in.	193 lbs.
No. 21	.0258 in	153 lbs.
No. 22	.0253 in.	121 lbs.
No. 23	.0226 in.	96 lbs.
No. 24	.0201 in.	76.2 lbs.
No. 25	.0179 in.	60.4 lbs.
No. 26	.0159 in.	47.7 lbs.

With the foregoing data it is possible to estimate the size of wire needed for heavy high-speed armatures. If scales are interposed, a safe loading or tension factor can be employed without danger of wire breakage.

HYDRAULIC PRESSURE TEST LOADS

Motor test loads are obtained with an adjustable hydraulic pressure pump outfit at the motor service shop of the H. N. Crowder, Jr. Company of Allentown, Pa. The motor load is varied by varying the load pressure with a large hand valve.

Because this outfit must be quickly adaptable for coupling up motors of varying frame sizes, a motor-driven levelling platform was designed. This platform can be lowered to take motors up to about 75 h.p. It has a top plate of ½-in. steel mounted on four threaded posts. The four posts are fitted with sprocket pinions and are driven by one sprocket chain that encircles them all. A ½ h.p. v-belted motor drives this

LOAD TESTS—Motor drives pump against adjustable pressure for testing performance of reconditioned motors.

sprocket chain through a gear and worm, for levelling the motor platform. The tested motor is fitted to the pump shaft with a large semi-flexible flange coupling, for which there are bushings to fit different motor shafts.

VERSATILE COIL WINDING TOOL

Two face plates drilled with a great number of evenly spaced holes provide a versatile coil winding tool for Buzzell Electric Works, San Francisco industrial contractors. The holes were drilled

COIL WINDER—Two plates with holes, and rods can be set for any winding.

on close centers in an identical pattern on each of the four sectors of the face plate. By inserting quarter-inch rods in the holes, forms of any shape can be set up. By different spacing between the two plates the width of the coils likewise can be predetermined. Both plates fit on a shaft which is held in a chuck mounted on the end of a variable speed motor, itself bolted to a lathe bed. Finished coils are easily removed by slip-

FUSE 'GUESSWORK' ENDED!

Indicator Perfects the Fuse with the "SENTRY LIGHT"

No need to waste costly production time locating blown fuses. When Indicator Renewable Fuses guard circuits, a tell-tale neon *Sentry Light* glows the instant an overload or short occurs. The shock-proof safety handle in which the *Sentry Light* is enclosed eliminates hazards and serves as a perfect fuse puller.

Indicator Renewable Cartridge Fuses are built not only to *detect* trouble, but to *prevent* it. Approved by Underwriters Laboratories, Inc., Indicator Fuses are carefully constructed to rigid specifications that assure utmost safety and dependability. Extra heavy gauge fibre and brass withstand a greater number of blows and outlast average fuses. Minimum number of loose parts. Indicator Renewable Links are standard and interchangeable.

Where one-time fuses only are used, an Indicator Sentry Light Adaptor is available.

In all installations requiring plug fuses—the Indicator 6 Multiple Fuse is unequalled for convenience, safety, and time-saving. Six fuse links housed within one chamber permit the fuse to be used six separate times without removal from the fuse socket. Should the fuse blow, the *Sentry Light* glows and is easily detected even in the dark. By turning the safety handle one notch to the right, a new fuse link is brought in circuit.

Write Department 301 for folder containing full details about complete line of Indicator Fuses.

INDICATOR CORPORATION

32-36 GREEN ST. NEWARK, N. J.

THE FUSE WITH THE "SENTRY LIGHT"

UMI

Now you can have

Smooth Control of Voltage

for 5-Kva. loads on 230-volt lines with Type "TH"

TRANSTAT* REGULATORS

New manufacturing facilities permit us to offer Type "TH" Transtat Regulators for larger Kva. loads. Standard single-phase units are now available for regulating up to 45 amperes throughout a range of 0 to 130 volts; also for regulating 22.5 amperes throughout a range of 0 to 260 volts. These units may be ganged for controlling voltage to three-phase loads.

The Transtat provides the ideal method for controlling voltage in alternating current circuits. It is a continuously variable auto-transformer regulator of the commutator type. Features are smooth control, high efficiency, good regulation, and moderate cost.

Send for Bulletin No. 1176A.

*** Patents 1,993,007 and 2,014,570; other patents pending. "Transtat" trade-mark registered U. S. Patent Office.**

AMERICAN TRANSFORMER COMPANY

178 EMMET ST. NEWARK, N. J.

AMERTRAN
QUALITY TRANSFORMERS SINCE 1901

Among the MOTOR SHOPS

[FROM PAGE 34]

ping one of the plates off the end. This tool has the versatility required in a shop, where the coil winding needs vary with all classes of work.

DOOR PICKUP

There are two easy ways to load trucks at the shipping dock of the Electric Motor Repair Company's new plant in Raleigh, N. C. First, the dock floor is just the right height for small items to be "scooted" into the truck. For heavier items there is a travelling crane that extends along the full length of the 195-ft. machine tool bay to this shipping dock.

For those who like the full details, the crane span is 17 ft., its four wheels

LIFT OR SKID—Shipping dock arranged for easy crane or floor-skid handling direct from trucks.

are 18-in. diameter, running on a 2-in. track. The crane I-beam is 8-in. by 4-in., and is rated 3 tons. This crane may be moved right to the rolling doors, in case someone's truck doesn't quite clear this company's shipping entrance.

REPLACEMENT V-BELTS — *As an important part of its motor repair service, the Electrical Maintenance Service Company of Bridgeport, Conn. carries a large stock of V-belts for replacement. Two hundred sizes are kept in convenient steel stock bins with numbers stenciled conspicuously in white near the front for quick identification. Part of a $5000 stock of testing instruments is stored in the first bin.*

EASY-TO-READ SPECIFICATION

When the Spaulding Electric Company of Detroit developed its latest winding specification forms, seven important kinds of data became easily readable, and fit on standardized post binder records.

The essential data was broken down into—coils, cores, insulation, commutators, connections, fields and job information. Heavy black rules, about 1/32-in. wide, plainly separate each kind of data, making it easy to locate the Specific information.

TIME SAVER — Data sheets ruled and headed in heavy lines and characters, aid readability during later check-backs.

WINDING SPECIFICATION

Date

H. P. | R. P. M. | Volts
K. W. | Poles | Phase | Cycles
Make | Frame No. | Armature No.
Type
Winding | Amps

WINDING DATA

COIL	No. Turns	Size B. & S.	
	Wires in Parallel	Taken	
	Type	Length Loop	
	Layers	Turns per Layer	
	Span	Weight per Set	
	Width Finished	Height	
	Back Distance		
CORE	Diameter	Width	
	No. of Slots	Depth	Width
	Type of Slot	Air Gap	Insc. under Slot
Insulation	Phase		Bottom of Slot
	Wedges		
	Between Coils		
	Slot		
	Coil		
Commutator	No. Bars	Insulation	
Connection			
FIELD			
JOBS			

Signed

Application Installation *and* MAINTENANCE

In Industrial, Commercial and Institutional Buildings

KEEP COOL!

So many people talk about the weather that it's up to the electrical maintenance man to do something about it. Here are some hot-weather pointers. . .

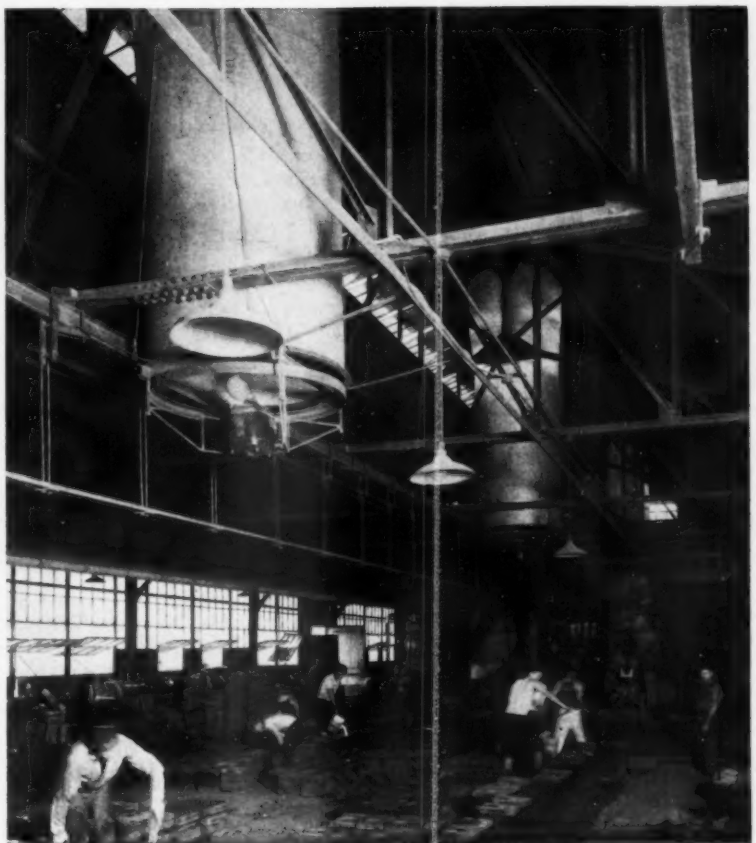


Photo Courtesy of Hartzell Propeller Fan Co.

NOT SO DUSTY!

Master Electric Foundry, Dayton, O., removes dust and fumes with this fan installation. In the summer the men claim they feel as though the plant were air conditioned and their work shows good effect.

TO the electrical maintenance department falls a big share of the responsibility for keeping operators and equipment as cool as possible. Some timely maintenance pointers on ventilation, therefore, should be in order.

First—Motors

If the functioning of existing motor protection depends upon current consumption, motor burnouts may be experienced in particularly hot locations, because of the high surrounding temperature. Therefore, in thinking about ventilation, the maintenance man should not overlook the fact that motors must be kept cool. To avoid a dangerously high winding temperature, it may be necessary to install fan-cooled motors, or employ some means of protection which operates on temperature rise. Motors are available with thermostatic elements built in the windings, which shut off the power when temperatures become excessive. Whatever is done, special inspection for motor heating should be on the program.

Hot Equipment

If operators of moulding presses or other equipment, which gives off heat, complain that working conditions are intolerable during summer months, a special blower or fan installation might be worth while. If unit heaters are used to heat the building, they can be operated as blowers in summer, directing a blast of air toward hot spots. Cold

UMI

TEMPERATURE 57 DEG., HUMIDITY 90 PER CENT, ALWAYS

Unusually close temperature and humidity control for fruit pre-cooling was required by the La Verne Lemon Growers Association, La Verne, Calif. A completely automatic air-conditioning installation now maintains a constant temperature of 57 deg., and constant humidity of 90 per cent.

Interlocking fan control and outside air damper makes it possible to shut down the refrigerating equipment when weather conditions permit the use of some outside air, thus reducing operating costs. Equipment is automatic, thermostats and humidistats maintaining the desired inside temperature and relative humidity. Graphic temperature and humidity recorders show that constant conditions are maintained. Operating costs have been exceptionally low.

CLEAN AIR FOR OFFICE BUILDING

The most complete air conditioning and most healthful atmosphere available for a commercial building will be supplied this summer in the Field Building, one of Chicago's largest and most modern office buildings. Already air-conditioned to the extent of temperature and humidity control, the lower arcade and first four floors of this 45-story building will be equipped with electrostatic air cleaners. Offices, shops, and restaurants will be included.

The air-cleaning equipment has a capacity of 272-700 cu. ft. of air per minute, and an efficiency of over 99 per cent of weight of particles removed from the air. Power requirements (10 kw.) are small, and maintenance cost is low.

Fresh Air

The efficiency of natural ventilation can be increased by the use of roof ventilators. Types are available with built-in, motor-driven fans, which involve low installation and operating cost. To make them effective, ample air inlets should be provided. It is advisable to place the openings at low levels in the building and that they have about twice the throat area of the ventilators.

Where large quantities of dust or fumes are given off, some form of exhaust system should be used. When fumes are heavier than air, horizontal or floor ducts are required.

Sometimes it is a good idea to build a fairly tight enclosure around dust-producing equipment. A slight suction maintained inside the enclosure by means of a fan and ducts will draw air in from the surrounding area, and prevent the escape of dust.

In public and commercial buildings, and in many plants, of course, a central fan system provides the ventilation as part of the heating installation.

Fan Types

For ordinary heating and ventilating, fans will set up an adequate air flow. If positive displacement is required, however, compressors or rotary blowers should be used.

Fans are classified as the *axial flow* (or propeller) type and *radial flow* (or centrifugal) type. Propeller type fans are commonly used for moving air against moderate resistance, especially where no long ducts or heavy friction must be overcome, and where noise is not objectionable. Centrifugal fans are commonly used for comparatively higher pressures and where extremely quiet operation is desired.

Fan Operation

Three rules about fans of all types should be kept in mind: (1) the air capacity varies directly as the fan speed; (2) pressure varies as the square of the fan speed; and (3) the power goes up as the cube of the fan speed.

Unlike most other machines, fans may operate with equal efficiency at any speed permitted by their mechanical strength and safety. In practice, they may discharge through openings which vary from full open to full closed and the efficiency varies with these areas, although not according to any fixed law for all designs.

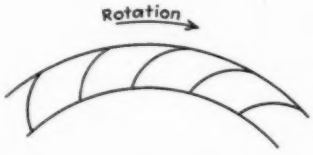
Fans are rated in accordance with tests set up by the American Society of Heating and Ventilating Engineers and the National Association of Fan Manufacturers. "Characteristic curves" are usually plotted for a constant speed, and horsepower, pressures, and efficiencies are given for various percentages of wide-open volume.

While the maintenance engineer need not master the details of fan design, the following broad principles should aid him in a choice for a specific installation:

(1) Centrifugal types should be used where pressures are relatively high, or high output velocities are required.

(2) If the outlet of a centrifugal type is partly closed off, the horsepower required decreases. Therefore, if outlet dampers or louvers are accidentally shut, there is no danger of burning out the driving motor.

(3) Propeller-type fans have satisfactory efficiency at low resistance, are low in first cost, economical to operate, and take up relatively little space. If speed remains unchanged the power required increases as the outlet area is decreased. The noise might become objectionable as the resistance is increased.



FORWARD-CURVED, multi-blade, centrifugal type.

(4) The "forward-curved, multi-blade" centrifugal-type fan (see sketch) is most commonly used in heating and ventilating because of its low peripheral speed, large capacity, and quiet operation.

Fan Motors

Where power is d.c. shunt-wound motors should be used for centrifugal fans. Either shunt-wound or series-wound motors can be used for propeller-type fans, although the series-wound is preferable. With a.c. supply, induction motors are commonly used for all types.

The torque required to start a fan or blower is only that required to overcome friction and the inertia of light moving parts. It is therefore no special factor in fan motor selection.

Of course, industrial applications involving hazardous or special service conditions might require special constructions. Splash-proof, explosion-proof, fully enclosed, or self-ventilated motors may be needed.

Fan Drives

Ventilating engineers prefer to mount the fan wheel directly on the motor shaft. This is usually possible with small centrifugal fans and with propeller fans up to about 60 in. diameter. When the fan wheel cannot be mounted on the motor shaft, it is good practice to

ELECTRICAL MAINTENANCE GUIDE SHEET

Some "ABC's" on Air Conditioning

A

The term *air conditioning* involves the control of temperature, humidity, purity, and movement of air. Unless *all* of these variables are under control, the atmosphere cannot really be called "conditioned."

B

Air is said to be *saturated* when it contains the greatest amount of water vapor it can hold at any given temperature.

C

The amount of water vapor in the air is referred to as *humidity*, which may be expressed as *absolute* or *relative*. Absolute humidity is the actual weight, in pounds or grains, of water vapor per cubic foot of air. Relative humidity is the ratio, in per cent, of the actual weight of water vapor in the air, to the amount which the air at that temperature would hold if it were saturated. In common usage, the term "humidity" means "relative humidity."

D

As the temperature of air increases, it is capable of holding an increasingly greater weight of water vapor per unit of volume. If the amount of water vapor is not increased when the air is heated, then the relative humidity decreases, because the actual quantity of moisture in a given volume remains the same, whereas the quantity that *could* be held increases.

E

If the temperature falls below the saturation point—commonly referred to as *dew point*—enough of the water vapor condenses until the amount remaining corresponds to the saturation for the new temperature.

F

Relative humidity is measured by a "hygrometer" or a "sling psychrometer" which involves the use of *wet-bulb* and *dry-bulb* thermometers and suitable charts. The wet-bulb thermometer has its bulb wrapped in muslin, with one end of the muslin immersed in water. Before a reading is taken, the thermometer is swung back and forth. The dry-bulb is the familiar type of thermometer.

G

Comfort cooling is concerned primarily with the *effective temperature*, whereas cooling for process work requires that the air be actually cooler, rather than that it merely seem to be cooler.

H

In still air, *comfort* may be attained with high temperature and low humidity, or vice versa, within certain limits. When air is motionless, a layer of moist air forms around the body, producing slight discomfort. A relative humidity of 40 to 50 per cent in winter is about the minimum desirable. Approximately 70 per cent relative humidity is as high as is desirable for ordinary cooling conditions.

I

The effective temperature of air can be lowered (1) by increasing air motion; (2) by removing part of the moisture content without changing the dry-bulb temperature; (3) by lowering the dry-bulb temperature by evaporating moisture, without adding or taking away heat; (4) by removing heat and thus lowering the dry-bulb temperature.

The first method increases evaporation of perspiration from the skin by bringing a greater volume of air in contact with it, and also tends to remove heat from the skin and thus make us feel cooler, although the actual temperature is not changed.

J

A ventilating system should be able to handle several complete changes of air per hour for a given space, without causing drafts.

K

A *central-plant* air-conditioning system is one in which the operating equipment is at one place. Usually a fan or blower forces air from outdoors through a washer for cleaning (in winter this adds humidity, in summer it aids in cooling); next the air is passed over coils for heating or cooling (depending upon the season); and the conditioned air is then distributed through the building in ducts.

L

Unit air conditioners are relatively small local units placed in a room to take care of one or two rooms or departments.

M

Mechanical refrigerating machines are of two general types—compression and absorption. In the compression-type machine the refrigerant, in the gaseous state, is put under considerable pressure and passes to a condenser where it is cooled and then collects as a liquid in a receiver. From there it flows to an expansion valve through which it passes to the evaporator coil at a rate that is slow enough to maintain a low pressure.

Under the low pressure in the evaporating coil the liquid refrigerant changes to the gaseous state and in so doing absorbs heat from whatever medium (air, water, brine) surrounds the evaporator coil. The refrigerant then passes to the compressor and the cycle is repeated.

N

Steam jet compressors are also used in air conditioning. These compressors operate on the principle that water vaporizes at low temperatures, under high vacuum. Water to be cooled is sprayed into the cold tank or evaporator of the machine, in which the pressure is kept at a very low point by steam jet. Under the low temperature the water boils and part of it is converted into vapor, lowering the temperature of the remainder.

O

Absorption refrigerating systems are not as widely applied to air conditioning as the other types. Ammonia is usually the refrigerant. The gas is absorbed in water and then pumped to the generator, which contains a steam coil. Heat from this coil drives off the ammonia, which then passes to the condenser, where its latent heat is removed. From the condenser the refrigerant, in liquid form, flows to the receiver and then through an expansion valve to the evaporator. Passing to the gaseous state it absorbs heat from the medium surrounding the evaporator coils, then returns to the absorber.

UMI

provide the fan with two bearings and connect the motor with a flexible coupling. If a solid flange coupling is used, care must be taken to maintain bearing alignment.

A belt drive often makes possible the use of a smaller and less costly motor, where the fan speed is lower than the speed of a motor of the required horsepower. A belt drive is generally desirable when an a.c. motor is used, because the most desirable speed of a standard fan for a given duty is seldom the same as the motor speed. Moreover, when there is some doubt as to the speed or horsepower requirements of the fan, it is best to use belt drive, because an inexpensive change in pulley will correct an error. Belt drive is also advisable if there is any danger of noise being transmitted through the air ducts, as in schools, churches, and auditoriums.

Fan Motor Control

Where a.c. is used, the motors are usually installed to operate at one speed, and only a starting device is provided. Volume or pressure is varied by means of dampers in the system.

For d.c. motors, a starting rheostat with no-voltage release is used where operation is at one speed for all conditions of service. An overload release should also be provided, if the horsepower requirement might suddenly be increased, as when a propeller-type fan is blocked off, or if all restrictions are suddenly removed from a centrifugal type.

A starting and regulating rheostat, with no-voltage release should be used where a fan with d.c. motor operates usually at normal speed, but, under some conditions, at below normal speed. When a d.c. driven fan is required to operate at varying speeds, but usually at less than maximum, a starting rheostat with no-voltage release should be used in combination with a field controller and the speed adjusted by varying the field resistance.

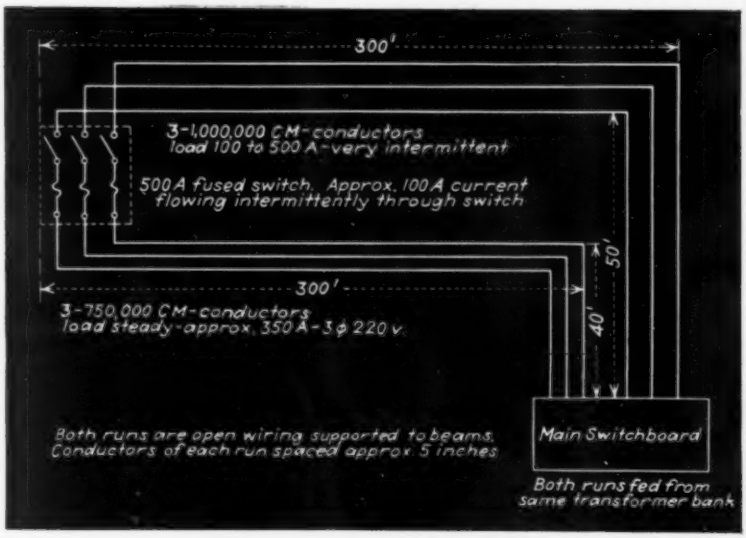
Scrubbers Rebuilt for Three Phase Circuit

Standard floor scrubbers such as are used in plants, commercial and institutional buildings are driven by single phase motors, repulsion or repulsion-induction types. A service cord is furnished for connecting to 110-volt supply at an ordinary convenience outlet.

This type of equipment was used in the Chevrolet plant at Flint, Mich., where service arrangements for portable equipment is three phase, 440 volts. For a time the janitor crews connected the 110-volt scrubbers to lamp sockets which were most easily reached. Sometimes the operator had to climb a stepladder in order to make a connection and sometimes the lamp socket was left in poor condition. A lot of the trouble that developed on the lighting circuits could be traced to the practice of using lamp sockets as convenience outlets.

To correct the condition two things could be done, (1) install an adequate number of 110-volt outlets, or (2) replace the single phase motors with 110-volt, three phase, squirrel cage motors. A study was made and the latter was found to be more economical. A contributing factor in favor of the induction motor was that the higher maintenance cost of the repulsion or repulsion-induction motor would disappear.

A three phase, 440/110-volt transformer with a 50-ft. cable for connection to the nearest 440-volt outlet was mounted on each utility hand truck used by the janitor crews.



***IMPROVES VOLTAGE REGULATION**—Extreme ends of two long runs of open wiring connected through fused knife switch.*

Avoiding Voltage Fluctuation

A common plant problem is fluctuating voltage, where feeders are of considerable length and the load is diversified. This condition existed in the tube plant of the Hygrade Sylvania Corporation, Salem, Mass. It is important here that voltage fluctuations be held to a minimum, therefore Arthur P. Martin, chief electrician, solved the problem by tying together the extreme ends of two long feeders through a fused switch. A loop was formed from the respective feeder control devices on the main switchboard.

The run of both feeders is open wiring supported to beams. Conductors of each run are five inches apart. Each feeder supplies 220-volt three-phase power from the same transformer bank. One feeder of three 1,000,000 c.m. conductors has a 350 ft. run from the switchboard and carries an intermittent load of 100 to 500-amp. The other feeder of three 750,000 c.m. conductors has a 340 ft. run and a steady load of approximately 350-amp. Far ends of both feeders are connected by a 500-amp. triple-pole fused switch through which approximately 100-amp. flows intermittently.

Before the switch was installed, fluctuation on the 1,000,000 c.m. line was six volts, plus or minus. After installation, fluctuation was reduced to three volts, plus or minus. The result was 100 per cent increase in regulation, because of reduction of reactive inductance and resistance.

Lamp Serves Dual Purpose

Lamps for a spray booth or hood over a cleaning bath may be used for a dual purpose. By connecting the lamp across the motor terminals, it will serve also as a pilot light to indicate that the blower is in operation.

"Our motor maintenance costs are considerably lower this year – What's the reason?"
"IRVINGTON INSULATION – we use Irvington Seamless Bias Tape in our motor repairs and they stand up longer"
Look for the RED LINED CORE

Specify IRVINGTON INSULATION

Irvington Standard Seamless Bias costs no more than the old style with sewed seams, and may be wound continuously by hand or taping machines.

High dielectric strengths, high tearing and tensil strengths plus remarkably long life—make it truly the most economical insulation for use by Electrical manufacturers—repair shops and maintenance departments.

STANDARD OF THE WORLD
IRVINGTON INSULATION
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Write today for samples and prices

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IRVINGTON, NEW JERSEY, U.S.A. *Est.* **1905**

VARNISHED CAMBRIC • VARNISHED CAMBRIC TAPES • IRV-O-SLOT • VARNISHED CANVAS
VARNISHED SILK • FLEXIBLE VARNISHED TUBING • VARNISHES AND COMPOUNDS

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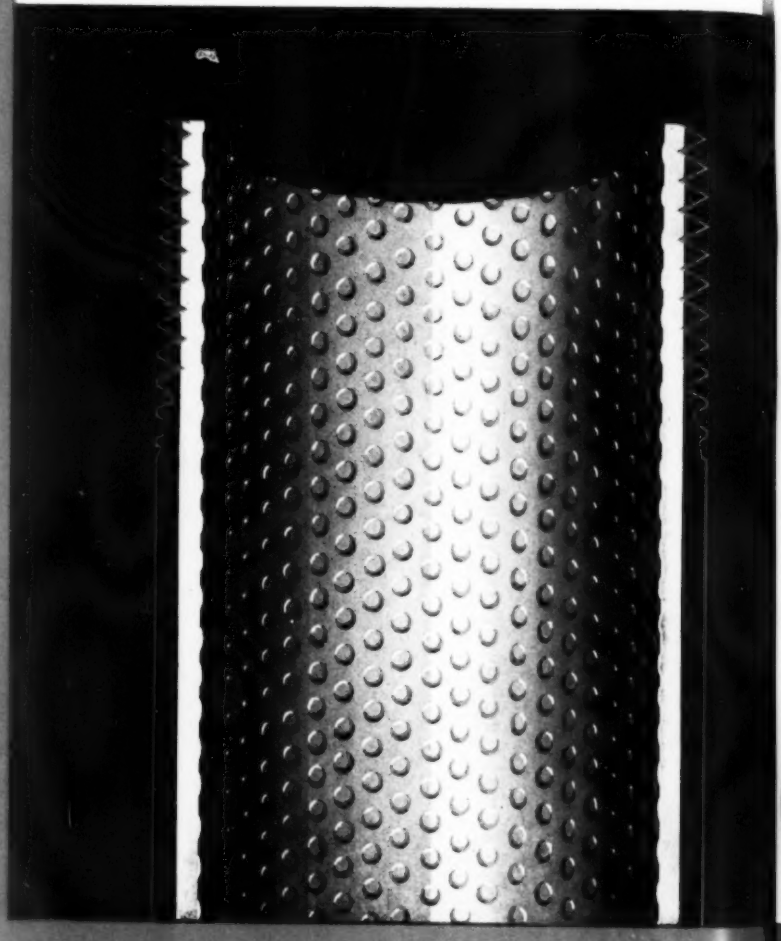
NO OTHER RACEWAY FOR WIRING CAN GIVE YOU *all* THESE FEATURES

- Cold-Rolled Open-Hearth Steel
- 100% Electric Resistance Weld
- ✓ Adequate Protection
- Light Weight
- Easy to Cut
- Easy to Bend and Rebend
- No Threads
- 3 Simple Fittings
- Knurled Inside Surface
- Uniform Corrosion-Resistance
- Easy to Install
- Universal Acceptance
- Low Cost
- Widespread Distribution
- Assistance of a Field Force

Adequate Pr



ELECTRUNITE Steeltubes

Reg. U. S. Pat. Off.

MORE THAN 150,000,000 FEET INSTALLED

Protection

WITH THIS BETTER RACEWAY FOR WIRING

Look at the illustration at the left. There you see the contrast between the walls of ELECTRUNITE Steeltubes and ordinary threaded conduit. ● The wall thickness of ELECTRUNITE Steeltubes was not arrived at by guesswork but is the thickness recommended by the Underwriter's Laboratories for adequate electrical and mechanical protection. Notice that at joints, where ordinary conduit is cut away in threading, ELECTRUNITE Steeltubes has a greater wall thickness, providing greater protection. Notice, too, that at unthreaded portions, the wall of ordinary conduit is thicker than necessary — therefore, heavier and more difficult to handle. Both have the same inside diameter for wires. ● Because it is made by a modern process — because it is threadless, lighter in weight and easier to handle, bend and install — *genuine* ELECTRUNITE Steeltubes provides a means for you to offer the positive protection of a "pull-in — pull-out" system at lower cost per outlet — and at higher profit to you. Other contractors are using it to obtain a greater share of the business in their territories. Why don't you?

Ask your electrical wholesaler to give you figures showing that *genuine* ELECTRUNITE Steeltubes, with all fittings, costs less to buy and to install than ordinary conduit — and no more than imitation brands that do not offer all of its advantages. If he doesn't stock it, write us for complete detailed information and the name of your nearest distributor.

● ● ●

Knurled inside finish (patent No. 1,962,876) available in ½", ¾" and 1" sizes.

ELECTRICAL DIVISION

Steel and Tubes, *Inc.*

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

CLEVELAND . . . . OHIO

REPUBLIC STEEL

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SPOT THE CUT.

MILFORD FLEXIBLE
The Blade with the
EASY-STARTING TEETH

With this blade you can start cutting with the first full sweep of the blade.

Will not slip off the cutting line.
The teeth will not catch in corners.
Start a cut at any angle.

MILFORD FLEXIBLE
The ideal blade for the electrician. It will not break off or fly to pieces in a frame—it is safe. Teeth are file hard and this blade can be used to cut anything used on the job.

Ask your jobber for
MILFORD FLEXIBLE
The Blade with the
EASY-STARTING TEETH

THE HENRY G. THOMPSON & SON CO.
NEW HAVEN, CONN.
Saw Makers for over Half a Century

MAINTENANCE OF SHOW WINDOW LIGHTING

By E. W. Wheeler,
Engineer
Reflector & Illuminating Co., Chicago, Ill.

Since so much consideration is given the element of efficiency, when selecting show window reflectors for the original installation, it is only natural for the maintenance of this efficiency to receive careful attention.

Using first quality reflectors, any loss in efficiency is of a temporary nature only, and the efficiency of the show widdow lighting installation may quickly be restored to its original value by applying the proper corrective measures.

The maintenance of the show window lighting is really quite simple because there are only two principal factors contributing to the temporary depreciation of the lighting efficiency, namely: dirty reflectors and old blackened or incorrect lamps.

Mirrored glass and prismatic reflectors are the types most generally found in the show windows of today. Both may be easily cleaned and restored to their original degree of efficiency.

Mirrored glass reflectors are cleaned by wiping the inner side of the reflector with a damp cloth to remove the accumulation of dust and other foreign matter. Use only water for dampening the cloth. Do not dip mirrored glass reflectors in water. The outer side of the reflector should never be washed but simply wiped with a dry cloth to remove dust accumulation. Naturally, the efficiency of the mirrored glass reflector is not affected by any dirt or dust accumulated on the outer side; consequently, the outer side of a recessed mirrored glass reflector is rarely, if ever, cleaned.

Prismatic reflectors are cleaned very much after the manner of any kind of glassware. They may be dipped in the cleaning water and the outer side should be scrubbed with a soft bristle brush to

DIRT SLOWS SALES—Keep window lighting clean or it becomes a weak salesman and wastes your money.

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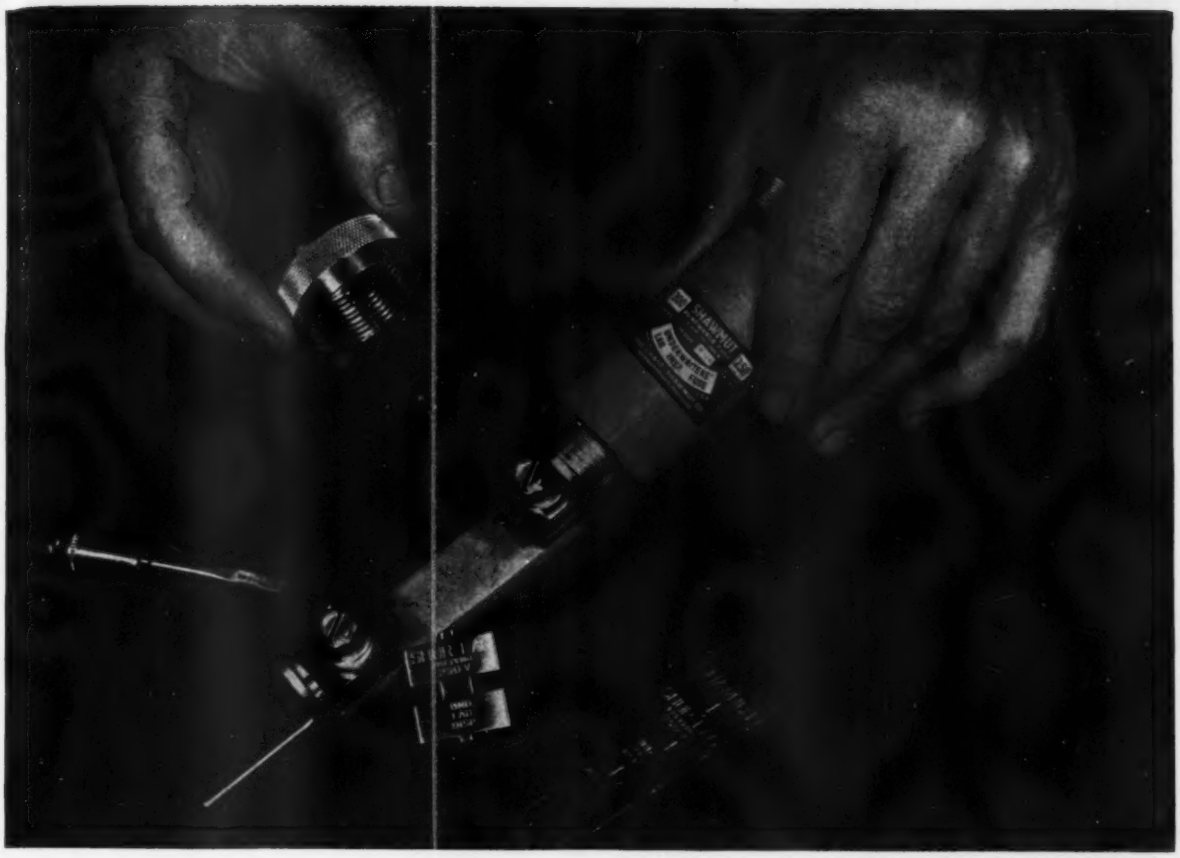

WHERE SECONDS MEAN DOLLARS

Remove the cap, slide the fuse out, loosen two screws, replace the link, reset the screws, replace the fuse and the cap.

That's ALL, with a SHAWMUT SHUR-LAG FUSE, and you're in circuit again, at a saving in time and money. There are no costly shutdowns, with men and machinery idle.

SHAWMUT SHUR-LAG FUSES are the simplest and sturdiest time-delay fuses made. They offer the utmost in economy, service, and protection. They prevent needless blowing, but act in time to forestall damage, immediate or cumulative. And the price is no higher.

SHAWMUT S SHUR-LAG

RENEWABLE FUSES

Approved by Underwriters' Laboratories

The **CHASE-SHAWMUT COMPANY • NEWBURYPORT • MASSACHUSETTS**

Fuse makers since 1893

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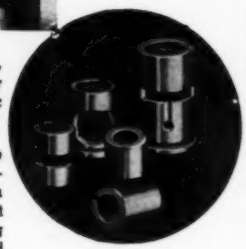
YOU don't have to be a wizard to produce instantly, at any time, one or one million bearings completely machined and finished, ready for assembly, into electric motors of any make or model from 1/40 to 60 hp.

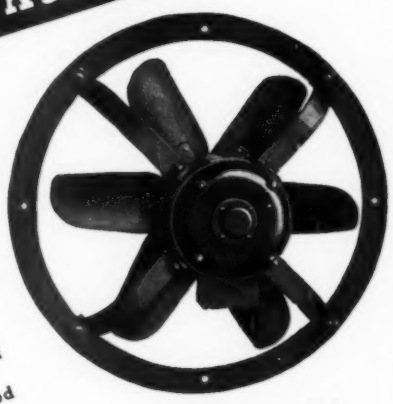
These Bunting Standardized Electric Motor Bearings are made exactly to the dimensional requirements of the motors they are intended to service. They always fit. You can buy them as you need them, in small or large lots, at attractive low prices. Write for catalog . . . The Bunting Brass & Bronze Company, Toledo, Ohio. Branches and Warehouses in All Principal Cities.



BUNTING Quality
BRONZE BUSHINGS • BEARINGS
MACHINED AND CENTERED BRONZE BARS
BABBITT METALS

A Quality EXHAUST FAN AT A Low COST

Peerless 600



Peerless 600 type fans are good, dependable low priced fans

Totally enclosed, long hour splitphase motor
Thrust bearing for horizontal or vertical mounting
Six wide, heavily pitched Dural blades
Entire assembly carefully balanced
No radio interference

Here is a fan you can recommend for any job. Also suited for air conditioners and unit heaters. 16" to 24" fan sizes. Write for complete calalog describing Model "600" and Peerless three speed multi-blade exhaust fans.

FAN AND BLOWER DIVISION

THE PEERLESS ELECTRIC CO.
WARREN, OHIO

remove the accumulation of dirt in the deep recesses between the prisms.

There can be no standard of time interval between reflector cleanings to fit all installations. The frequency of cleanings may vary from two weeks to two months and more, depending upon local dust and smoke conditions. It is good practice to wipe out the inner side of the reflectors every time the major window displays are changed.

Clean reflectors alone will not insure one hundred per cent of the original show window lighting efficiency. A check of the lamps is equally important.

The original maximum efficiency of a show window lighting installation is based not only on clean reflector conditions but also on clean lamps of standard maximum light output, installed in proper focal relation to the reflectors. Thus, the lamps should be checked on the following points: (1) cleanliness, (2) hours of use, (3) voltage and (4) position.

Clean Lamps

No special effort is necessary to maintain the lamps in a clean condition. If they are wiped with a dry cloth each time the reflectors are cleaned, no additional care is necessary.

Manufacturers assign "rated average hours of life" to their lamps. Most standard lamps are rated at 1,000 hours. Whereas many lamps will burn far in excess of 1,000 hours, after 1,000 hours of burning, their efficiency or rate of light output falls off markedly. Consequently, a show window lighting installation using a large proportion of old lamps (lamps that have already burned in excess of 1,000 hours) cannot operate at maximum efficiency, no matter how well the reflectors and lamps are cleaned. Instead of replacing a lamp only after it has burned out, good practice is to start with all new lamps and relamp the entire installation after each 1,000 hours of burning.

Check Voltage

Lamp efficiency or light output is also a function of voltage. Lowering of the socket-voltage will reduce the light output of a lamp. Whereas, at the time the original installation was made, the socket-voltage and the rated lamp voltage corresponded, additional loads on the line may have caused the socket-voltage to drop. For example, if the socket-voltage has dropped from the initial 115 volts down to 110 volts, the resultant loss of light, using lamps rated at 115 volts, is about 15 per cent. Therefore, to restore the original lamp efficiency, the 115 volt lamps should be replaced by 110 volt lamps.

Maintenance of lamp position is very important. Show window reflectors

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are designed to provide a definite beam pattern to best illuminate the show window for which they are selected. The required beam pattern is maintained only when the lamp filament is in correct focal relationship to the reflector. Manufacturers insure this correct lamp positioning by supplying a holder with the reflector, which brings the lamp of recommended wattage to the proper height within the reflector. Any change in the relative position of the lamp filament produces a distortion of the beam and an immediate depreciation of the show window lighting effectiveness. Therefore, it is of utmost importance to use only lamps of the wattage recommended for the reflector and holder assembly.

Circuit Identification Saves Trouble

Individual switches and feeders should be plainly marked as to what they control. This is vital where electric motors are installed in various locations in industrial plants, and commercial and institutional buildings. Labeling saves time and unnecessary hunting and testing if trouble develops. Some method of identification is especially necessary in a plant that operates 24 hours a day, with possibly only one or two men on duty at night. Even when an electrician is on duty at all times, labeling the circuits will help in locating trouble.

Each motor or group of motors is supplied by a circuit which has a switch near the main feeder, fused according to the horsepower of the motor or motors, supplied. This switch should be labeled on the outside with the name and number of the machine or some name such as "fan" or "house pump." Usually the machines are named by the men working with them, and their terminology may be better to use than technical names. If the switch is on a feeder which supplies a large group of motors, or possibly a whole separate building, it should be labeled so as to distinguish it from a switch supplying only one machine.

Fuse Record

Inside the cover of the ordinary safety switch there should be plainly marked the size of the fuse in amperes for the circuit. If this is not done it will be found that after a year's operation the circuits will invariably be overfused, thus giving very little real protection.

On the inside cover of a group feeder switch, it is a good plan to list the entire number of motors, indicating what they drive. Trouble seldom occurs at this point, but it is often essential to know whether "killing" the circuit will stop some machine which should not be stopped unless it is absolutely necessary.

Motor Modernization Reduces Power Costs

A saving of $300 a month was effected by converting two wound-rotor motors to synchronous motors in a flour mill on the Pacific Coast. This saving represents a return of 33 per cent per year on the investment.

Modernization of existing equipment and reduction of power bills are two factors which require constant attention. Equipment which is allowed to remain in operation too long without alteration or modernization is apt to consume an excessive amount of power, when compared with similar equipment of more recent date.

In this case the saving made by the conversion of the two fifteen-year-old 400 hp. motors was due partly to power factor correction, permitting operation at 80 per cent leading power factor, and partly to increased efficiency. Capacitors could have been used for improvement of power factor; however, modernization of the motors, giving increased life, was more economical.

Time Limit Cut-Outs Save Maintenance

The maintenance cost of low-tension systems, may be reduced to a minimum, by the use of time limit cut-outs. They may be used in fire alarm, burglar alarm, hold-up, factory call, siren, annunciators with remote signals, and any other system where audible signaling devices are used.

These time limit cut-outs are designed to limit the duration of current flow in signaling circuits. They may be adjusted to allow apparatus to operate for a specified time, such as 1 to 30 minutes, and then automatically cut-off. This action prevents damage to contacts and windings due to over-heating.

In general, two types of time limit cut-outs may be obtained, one being the manual reset type, the other the automatic reset type. The manual reset unit must be returned to normal position by hand, after it has opened the circuit. The automatic reset is returned to the normal position automatically, after a

Prest-O-Lite Trade-Mark TORCHES AND SOLDERING IRONS... *ideal for electrical work*

● *Prest-O-Lite* Torches and Soldering Irons are available in convenient and moderately priced outfits, covering every open-flame or enclosed-flame requirement of the electrical contractor. These appliances are economical equipment for soldering, heating and brazing.

Prest-O-Lite appliances operate on *Prest-O-Lite* Gas, which can be obtained conveniently in small tanks at any of the thousands of *Prest-O-Lite* Gas Exchange Service Stations. You exchange your empty tank for a full one and pay for the gas only.

Your jobber will gladly demonstrate the many features of *Prest-O-Lite* equipment. Call him, or write the Linde office near you.

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
New York and Principal Cities
In Canada:
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Where men seek to build better . . . .

where the urge is to improve that which has been done . . . . .

where research is added to the knowledge and experience of yesterday . . . .

where profit is not the sole desire . . . .

THERE we find the person or group that will achieve a real success.

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In this matter of building dependable TRANSFORMERS it likewise is true that a practiced desire to build better leads to supremacy.

DONGAN'S SUCCESS in the air cooled TRANSFORMER markets has been simple. Two words explain that leadership . . . **build better.**

"The Dongan Line Since 1909"

Dongan Electric Mfg. Co.

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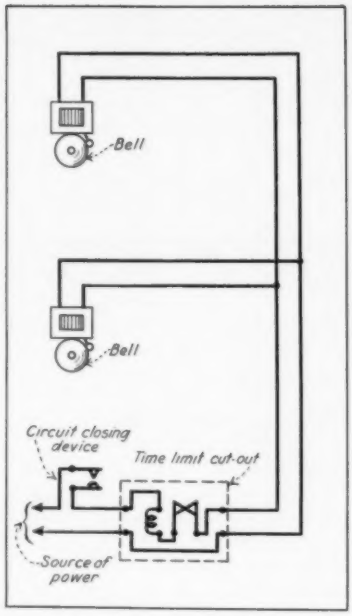


***MONEY SAVER**—Signaling circuit using a time limit cut-out.*

short period of time, and is again ready for service.

The accompanying illustration shows a circuit of bells using a time limit cut-out. The contacting device may be a pushbutton or automatic contacting device such as a program device.

Doubling up in Battery Charging

Here is an idea which may be helpful to the maintenance man who services electric trucks used in the plant: Messrs. Taylor and Wise, Ltd., Richmond, England, service agents for the Electric Storage Battery Company, added an electric vehicle to their fleet of "petrol vans." With a few changes in the charging equipment, the vehicle battery is charged without using current other than that passing through customer's automobile and radio batteries on charge.

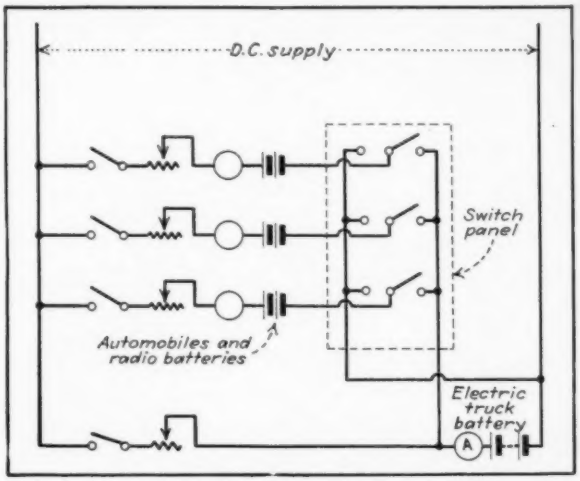
The vehicle battery is used in place of the resistance usually necessary in battery charging circuits. Power is used which otherwise would be lost in heating up the resistors, and the right amount of current flows through the battery to charge it in readiness for the next day's service. The only time extra current is required for the vehicle battery is when an exceptionally large number of customers' cells are on charge.

The diagram shows the arrangement by which current in any charging circuit may be switched to pass through the vehicle battery. This battery can be charged separately by switching it over to its own charging circuit.

A mercury arc rectifier converts a.c. to d.c. which can be varied from 60 to 250 volts with an output of 30 amp. Average load totals 20 amp. The charging equipment is designed for 3 circuits of 6, 4, and 3 amp., 2 circuits of 2 amp., 2 circuits of 1 amp., and 2 circuits of ½ amp. A single-pole, double-throw switch in each circuit permits flow of current through the vehicle battery and any or all of the customer's batteries. All these switches are mounted on one panel.

Keep Motors Running!

In a study made by a utility engineer, aproximately 80 per cent of motor outages in industrial plants were due to voltage dips and instantaneous low-voltage releases. Application of time delay to the low-voltage releases will permit most motors to operate through severe momentary voltage dips.



***BATTERY CHARGING CIRCUITS**—Switch arrangement permits same current to be used for charging electric truck and customer's batteries.*

Switching mechanism is isolated from interference with connecting wires, with make and break confined in a porcelain well, separated from opposite polarity and with no exposed mechanism. Parallel jaws evenly distribute the arc which is broken on a sector of a circle:—no single-point break to cause pitting. Double break in each leg sharply reduces the arc; prolongs life of contacts. Break overload is cut to minimum by the parallel-radius break and quick operating mechanism. Full floating, self-aligning contacts provide automatic adjustment for movable and stationary contacts. Rotor contacts project beyond barrier surface, which moves between stationary contacts without rubbing. Heavy spring tension on stationary contacts makes positive connections. Fibre barrier is treated to resist moisture; cannot swell or warp out of shape or alignment. Top-wired for convenient installation; all connections easily accessible in roomy box, with handy knockouts in variety of sizes. Finished in attractive gray enamel. For *complete-line* listings of these Type D Switches, ask for new Safety Starting Switch Catalog No. 7 . . .

SOLD THROUGH YOUR **HART & HEGEMAN DIVISION** ELECTRICAL WHOLESALER

THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

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GENERAL ELECTRIC CAN HELP YOU SELL ADEQUATE WIRING IN **6 WAYS**

1. Timely information on markets.
2. Suggested sales plans.
3. Suggested wiring methods.
4. A complete line of materials.
5. Uniformly high product quality.
6. New materials to meet new needs.

OF THE ADEQUATE WIRING PARADE

OFFERING CONTRACTORS EVERY AID TO BETTER AND MORE PROFITABLE WIRING

Today, the electrical industry, as one man, is interested in adequate wiring for further progress depends on improved wiring. Widespread publicity is telling consumers — your prospects — why they need satisfactory wiring in their homes. Adequate wiring will not yet sell itself, however. Public interest has been created but you must translate this interest into actual jobs.

CASH IN ON PUBLIC INTEREST

Therefore, let General Electric, an old veteran in adequate wiring promotion, help you to cash in on this growing interest. Naturally, you, the electrical contractor, will profit in reputation and money, because adequate wiring means better jobs.

GENERAL ELECTRIC WILL HELP

For years, General Electric has advocated adequate wiring. New materials have been developed as the need for them arose. Wiring methods and wiring systems have been designed by G-E engineers. With this background of experience, General Electric can help you in approaching prospects, in developing sales plans, and in choosing wiring methods and materials.

WIRING MATERIALS YOU'LL LIKE

The line of General Electric wiring materials is complete, including every material you might want for any type of wiring installation. G-E wiring materials are all of the same uniform high quality. They are designed to be used together and assure neat, time-saving and enduring installations. For your own selfish interest, find out more about G-E Wiring Materials and G-E Home Wiring.

G-E HOME WIRING IS ADEQUATE

General Electric Home Wiring employs methods which are the logical development in the evolution of wiring and meet every modern requirement. G-E Home Wiring may be installed in 101 different ways and is suitable for any type or size of house. With it, wire sizes are large enough and outlets plentiful enough. The layout is simple and direct. G-E Home Wiring is adequate and assures satisfied customers and larger profits to you.

See your nearest General Electric Merchandise Distributor for further information or write to Section CDW-888, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

GENERAL ELECTRIC

WIRING MATERIALS

APPLIANCE AND MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONN.

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More GOSSIP

Union Label Demanded

Only electrical fixtures, switchboards, externally operated switches, and eventually all wiring supplies, bearing an I.B.E.W. label will be installed by members of the International Brotherhood of Electrical Workers of the ninth district, comprising the far West, according to orders issued by J. Scott Milne, international vice-president of the district. Notice to that effect has just been sent to members of the union with copies to electrical contractors in Los Angeles and San Francisco. In his letter, Milne says that all local unions in the district have signified willingness to refuse to handle fixtures which do not bear the I.B.E.W. labels. It was effective July 1.

IN FATHER'S SHOES—*H. H. Hatfield, Jr., has taken over the job of running the Hatfield Electric Corporation of Utica, N. Y., during his father's illness. The books are showing the largest volume of business in ten years, he reports, but modestly attributes this to the general increase in building and industrial work in the Utica territory. H. H., Jr., went into the business upon his graduation from Cornell University in 1932. Since that time he has specialized in fixture sales and is justly proud of their well stocked and well kept fixture department.*

Light Sells Hotels

Statler hotels point to correct lighting as a service feature. A neatly printed card placed under the glass dresser top in each room tells the guests that "certified lighting" has been provided. The card says that the correct amount of light is available at the bathroom mirror, the writing desk, the reading lamp, and in the center lighting unit. They know because it has all been tested with a light meter.

FROM AUTO CITY:—Changes are made quickly in the automobile industry, so Detroit's industrial contractors are quick to improve their job handling methods. C. O. Reckard, of the Gray Electric Co., and president of the Detroit Electrical Contractors Association, points out that industrial contracting is becoming a combination of many miscellaneous large-scale operations, such as steel and copper fabrication, welding, concrete drilling. And all of this work must be coordinated to employ large crews. Week-end jobs are being done for the auto makers by this Detroit group, sometimes resulting in several firms dividing the work into non-conflicting sections.

Good Pot Boiling

Proper attention to the electrical needs of industrial plants in the Youngstown, Ohio, area brings to the Economy Electric Co. over $100,000 per year in sales of drives, control equipment, fuses and other items. This is in addition to its motor repair work. And Joseph Cutter keeps about 20 men busy in the service shop.

Cable Protection

In wiring the Nemours building at Wilmington, Del., Hatzel & Buehler, Inc., provided insulated conduit bushings for all 440-volt feeders, all 120/208-volt feeders over No. 4, and at all places where horizontal runs entered cabinets.

State Inspection Progresses

Since Michigan's state inspection law became effective September 1935, about 60,000 inspections have been made at an average permit cost of $2.72 per installation. This service was rendered in rural areas and in towns without an inspection force. Some 45 communities have abandoned their city inspector since the state inspection system got established with 60 men on its regional staff. In January 1937, there were 2450 contractors and 6100 journeymen carrying state licenses. State inspection fees are $3.50 for 4 circuits in existing homes and $2.50 per trip for the roughing-in and final inspection of new houses, anywhere in a county.

"Picture Layout"

New industrial plant projects reflect more and more the principles of adequate electrical layouts, reports Daniel L. Volker of Volker Bros., Inc., Buffalo. His company is just getting under way with the wiring for a new plant that covers a 43 acre site. Mr. Volker works from what he terms a "picture layout", covering the extensive underground distribution system and all general interior power and light wiring.

Record of Safety

A. H. Nuckolls of the Underwriters Laboratories in Chicago reports an unusual record for approved installations of explosion proof wiring. Not a single failure in industrial installations of explosive proof equipment has been reported during the past five years. Though this is largely due to the severe tests required by the Laboratories, it also indicates that good standards of installation and maintenance are observed by those who recognize explosive hazards.

DATA MAN'S MENTOR: An unassuming and congenial sort is W. H. (Webb) Laughton, who holds forth in Windsor, Ontario as proprietor of the Progressive Electric Co. George Patterson of Toronto, NECA executive committeeman from Eastern Canada, and chairman of NECA's Cost Data Committee, began his trade under Laughton. So Webb wears a satisfied smile.

Ideal Printing Job

One of the model newspaper plant wiring installations of the country is just being started in Cleveland, by the Martien Electric Co. for the *Plain Dealer*. Here, instead of placing new press units in an existing structure, a separate new building is going up, designed especially for high speed roto and color presses using volatile inks.

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rhythmically as he breathed. He did my breathing for me until the pulmotor got there. Then its mechanical lungs went to work and after about nine minutes my left eyelid fluttered. I didn't know but they saw it.

Meanwhile, the resurrection! Again the buzzing—at first very faintly and far, far away—then a faint green light like a new dawn seen from far off. Many times has this adventure been recalled to my mind as I watched the birth of a new day. It was a dawn of life to me and was rather hard to understand for what seemed a long time. The sound of the buzzing increased and the dawn was changing to a feathery light blue and I was conscious of my eyes being closed tightly and hard to open. Try as I might, those eyes would not open! I guess this was when they saw my eyelids flutter.

Sensations Reversed

Next came the sensation of suffocation, labored breathing. This was caused by the pulmotor cap. And as I gradually returned to consciousness, the buzzing in my head increased in volume, just as annoying as it was while I was being electrocuted.

I know the peculiar sensation of returning consciousness, for I was thrown from a horse once and knocked senseless. But this was quite different, this returning from apparent death. It was slower and not so sure.

After some time I vaguely began to realize what had happened. I could open my eyes just a little—enough to see the circle of anxious faces, without recognizing them. They were absorbed in watching a battle between life and death, with the odds favoring the Grim Reaper.

Conscious of a certain helpless weakness and discomfort, I became aware of the wooden clip on my tongue and tried to get it off. I wanted to talk but could not. I wanted to raise my arms. My left knee hurt. Redshaw, the kindly district superintendent, bent down to me and softly said:

"Take it easy for a while, my boy! You are in a serious condition."

Return of Fear

Then fear came and I wanted so to live. Was this only a temporary consciousness that would only last for a short time? How badly was I burned? Would the old heart stand the strain? Would my nerve crack under the ordeal? These were the questions that ran dizzily through my tired head. I said to myself—

"O. K.! Hold on, old boy! It's up to you. If you let go, the jig is up. They are doing the best they can for you, give them a lift. The rules say 'avoid excitement, keep calm'; alright, I'll play but I don't want to pass out now."

The First Smile

So I helped as best I could but I was scared pink and could have cried in sympathy with myself. Now my eyes were open and I could see all my pals standing there with woe-begone faces, pulling for me. The doctor knelt down and put the stethoscope on the chest, then the heart and took my pulse and smiled. Did that smile look good to me! He said:

"Let's keep it on a little longer. He is coming around nicely now."

When I heard that I could have yelled with joy. But I was afraid for fear of undoing the gain that had been made. But I did wish they would remove that tongue clip. It hurt now.

Soon I was beginning to feel warm—hot in fact. My chest hurt like hell. That left knee must be badly burned. My right arm pained too—a lot.

Finally the pulmotor was taken off, the tongue clip removed and the doctor again made his test and recommended quiet for a while longer. I could see the relief in the faces of my audience and I wanted to stay with them a long, long time. None of them would talk to me or encourage me to talk—

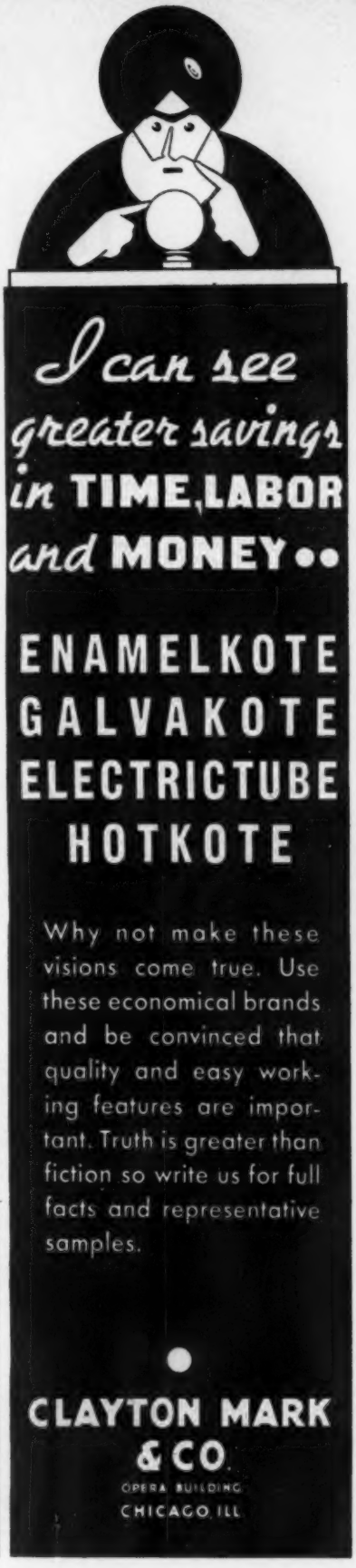
"Doctor's orders, old man! Sorry!"

Back in the World

I lay in the office, wrapped in three big horse blankets. Mr. Redshaw gave me some black coffee. My respiration was so rapid that the three blankets were drenched with perspiration. And during this time all that happened surged through my mind and left it graven in my memory. The more I thought of it the greater was my fear that all could not be well.

There were some forty-six major burns on my right arm and left knee that took over seven weeks to heal. Doctor Tom Pascal attended me during this time and had a hard time. I was in a highly nervous condition.

There has always been some controversy among medical men as to whether the electric chair produces suspended animation or true death. Perhaps my experience throws some light on it—though I was stricken with 2,400 volts and the chair, I believe, uses 1,800. There is no doubt in my mind that this method of execution is painless.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greater savings
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and MONEY••
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Why not make these visions come true. Use these economical brands and be convinced that quality and easy working features are important. Truth is greater than fiction so write us for full facts and representative samples.
CLAYTON MARK & CO.
OPERA BUILDING
CHICAGO, ILL

For Better LIGHTING JOBS

Luminous Fascia Signs Make Modern Fronts

by W. M. Potter,
Nela Park Engineering Department,
General Electric Company, Cleveland

Luminous displays, planned by the architect as part of the modernization of a building, are in demand, and create new opportunity for electrical installations.

The modernized front of the Fruehauf Hardware Company of Lakewood, Ohio, is a good example. It features a luminous fascia sign above the brilliant show windows and transforms the dull transom of the typical store-front into a potent selling force. And these units are simple and usually require no major structural changes.

In the Fruehauf store front, the panel of luminous diffusing glass is 44 feet long and 30 inches high, set in aluminum members and surrounded by a framing of black structural glass. Two rows of lamps are disposed behind the glass, in a white finished enclosure, the back of which has removable panels for maintenance.

In designing a fascia sign, several factors require consideration:

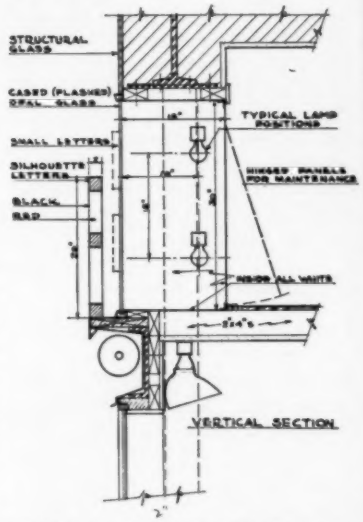
Selection of Glass—Efficiency of materials in producing brightness at night with a given amount of wattage must be balanced with the appearance of the materials by day. The choice lies between such materials as cased (flashed) opal glass, homogeneous (solid) opal glass, ceramic enameled glasses or even translucent marble.

Framing and Letters—The structure for supporting the glass is variously constructed of metal mouldings, structural sections or even sheet metal. In the Fruehauf store, aluminum sections were used with alumilite finish for permanence. Vertical muntin bars were also of aluminum. They may be T or H sections, and if not aluminum finish, they should closely match the tone of the glass.

AT FRUEHAUF'S—Two separate stores were united and the front made strong in selling influence by light, with well-designed night and day advertising.

Small letters are fastened to narrow aluminum bars, which are in turn fastened to muntins and framing. The large letters are bolted to the awning bar and anchored to a narrow horizontal bar. Sides of raised letter strokes should be comparatively light in color for good angle view, while the faces are dark for good contrast with the panel.

Arranging Lamps for Uniform Brightness—Apparent uniformity of brightness in the luminous panel helps



FASCIA CONSTRUCTION—Vertical and horizontal cross-sections of the Fruehauf fascia display. Note the special arrangement of lamps to avoid shadows on the glass at the round steel columns.

the legibility of sign letters, particularly when seen at a distance. With highly-diffusing materials, this effect is secured by an arrangement of lamps shown in the drawing, assuming the specification of a white enclosure around the lamps. The best obtainable white surfaces should be used in the enclosure, because an increase in the reflection of light from 75 per cent to 85 per cent will increase the panel brightness more than 22 per cent, with no added power cost.

NEW TRICKS FOR LUMILINE

Still in its infancy, the Lumiline lamp is gaining wide use. Its streamlined effect, new and different color, and uniform lighting effect have all helped to give it wide acceptance.

Equipments employing these lamps, simplifying their use or featuring them to advantage, are also keeping pace with improvements in the lamps themselves. These range from elaborate modern luminaires, utilizing new metal, glass and plastic materials, to simple wiring

FUSES ARE IMPORTANT ENOUGH TO BE SPECIFIED by NAME

"Jefferson-Union" Fuses have been regularly specified by the men who know since before the beginning of this century.

Improvements have kept apace with the requirements and suggestions of these practical electrical men — always keeping in mind that simplicity, ruggedness and accuracy are prime essentials.

For the protection of motors and equipment — to prevent unnecessary burnouts — Jefferson-Union Fuses are the experienced electrical man's first choice . . . To be safe, specify them by name.

JEFFERSON UNION
Renewable FUSES

JEFFERSON ELECTRIC COMPANY

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The Badger
Synchronous Electric

TIME SWITCH
for successful and profitable installations

No wonder so many electrical contractors like to install Badger Time Switches. Dependable, accurate, simple in construction and built to give many years of satisfactory service, these time switches fully meet every need. It is generally known that they are easily installed and operate economically. Approved by the Underwriters' Laboratories. Reasonably priced. See your wholesaler or write for literature.

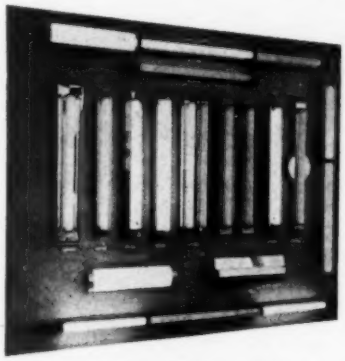
RELIANCE AUTOMATIC LIGHTING COMPANY
1937 MEAD STREET
RACINE, WISCONSIN

For Better LIGHTING JOBS

(FROM PAGE 50)

strips easily produced, in standard form, at low cost.

The Wiremold Company of Hartford, has elaborated on its line of fittings, to make it easy for Lumiline sockets to meet almost any requirements. Curtis Lighting of Chicago, added fittings for Lumiline lamps to the familiar Curtistrip line. The National Electric Products Company of Pittsburgh, now makes use of a two-prong type of Lumiline socket, so that Lumiline lamps can be used in its standard type of plug-in strips. Other companies, such as Daybrite Reflector Company of St. Louis, Markle Products Company of



LUMILINE FITTINGS—A variety of plug-in strips and removable reflectors to which Lumiline lamps have been adapted.

Buffalo, Novelty Lighting of Cleveland, Garden City Plating Company of Chicago, and Kliegl Brothers of New York, manufacture similar devices.

For decorative effect many standard designs are available featuring polished shapes, brushed metal surfaces, and porcelain enamel. Some are combined with glass, Catalin rods or fins, sandblasted and etched designs.

In many cases, they are combined with other types of lamps. Practically every kind of modern translucent or transparent material and opaque reflecting surface is being employed.

CORRIDOR CAMPUS

About 8000 students of the University of Pittsburgh now use the uncompleted Cathedral of Learning. Therefore,

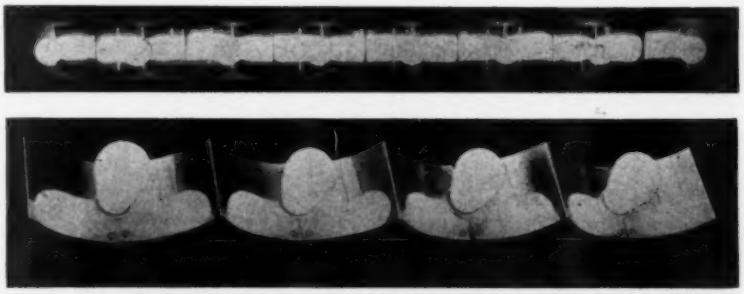
CATHEDRAL OF LEARNING—Temporary corridor lighting arranged to resemble a finished job.

temporary lighting had to be provided in some areas, until the permanent job is ready.

This corridor in the ground floor has 200-watt enclosed units at 15-ft. centers, with four outlets connected to each temporary circuit. As a further safety measure constant-service circuits supply night-light outlets, where corridors intersect or make a turn. Although there was good light, the candid camera's shutter was not left open long enough. It failed to register a group of U. of P. students gathered near the elevators that whisk them to one of the Cathedral's 42 floors of higher learning.

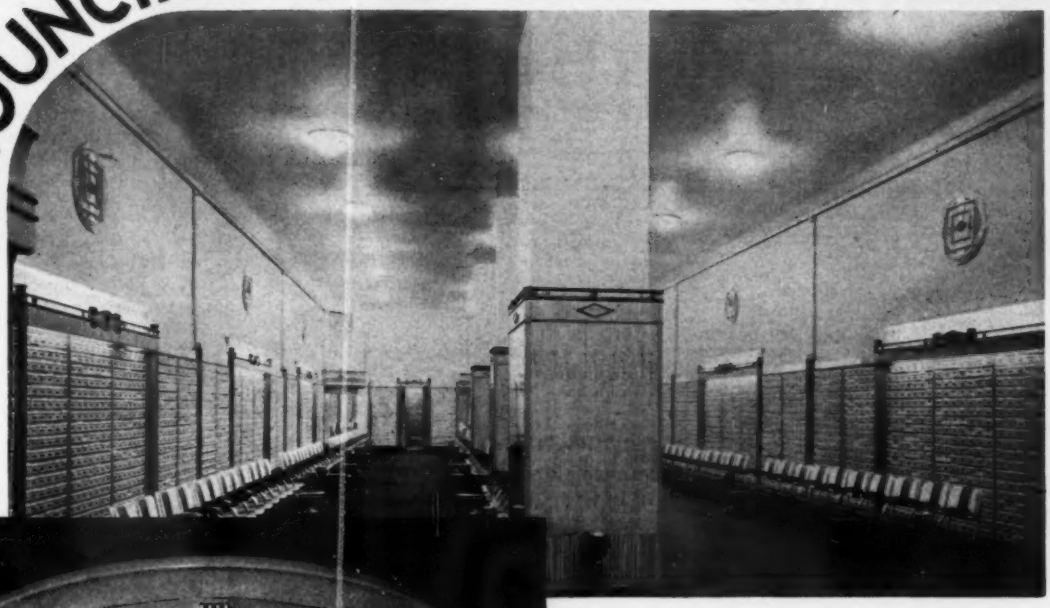
REFLECTOR INSERTS

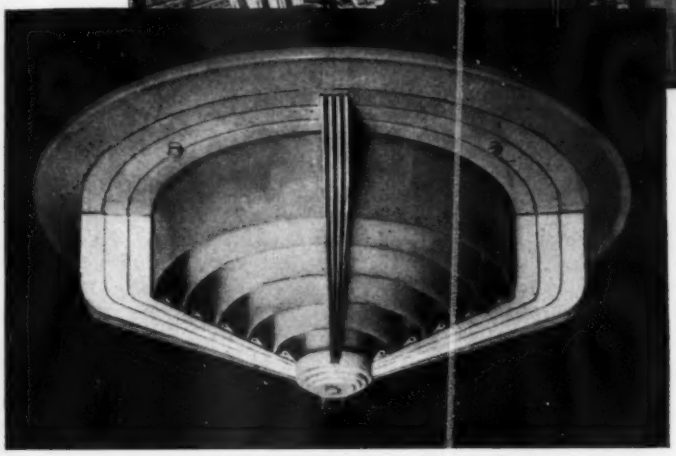
These inserts are made of Alcoa lighting sheet and have a parabolic contour. They can be placed between an exposed lamp border or sign letter treatment to redirect the light to better advantage. At the same time the light from the two lamps joins to produce an interesting linear pattern.



SOMETHING NEW—Aluminum lighting sheets give good effect to a sign

ANNOUNCING STER-LITE FIXTURES





by Sterling

There's no doubt about it—store building and remodeling is reaching boom size proportions. Long needed lighting improvements are at last getting attention.

Outstandingly modern in design—strikingly beautiful in appearance—tomorrow's word in efficient illumination—Ster-Lite Fixtures are the Key to a big share of the lighting contracts involved. Write today for brochure containing complete description with pictures of outstanding installations.

Another design achievement by Sterling advances interior lighting efficiency!

Ster-Lite Fixtures—a balanced combination of Sterling Lite-Flo Reflectors and opal glass louvers do the trick. The reflectors direct light to the working plane with highest efficiency—the louvers diffuse the light to illuminate vertical surfaces—the combination gives better illumination—more effective light per watt-hour of current used.

Every Electrical Contractor should have the brochure describing this revolutionary development in modern commercial lighting fixtures. It's an entering wedge of interest—a key to the attention of builders, owners, and operators who are working on remodeling plans. Furnished free on request.

REFLECTOR & ILLUMINATING CO.
1435 West Hubbard St. Chicago, U. S. A.

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Questions ON THE CODE

Answered by F. N. M. SQUIRES

Chief Inspector New York Board of Fire Underwriters

"T" Marked Switches and Breakers

Q. *"I understand that there is a rule requiring the use of a T rated switch on lamp circuits. Is this correct? And if the small residence type of circuit breaker is used to control lighting circuits, must this have a T rating or be twice the rating of the ampere load to be used on it?"—F.J.S.*

A. This is a matter which is not covered in the 1935 National Electrical Code but will be in the 1937 edition.

The 1935 Code requires a switch controlling a sign transformer to have a rating at least twice the current rating of the transformer. This was due to trouble experienced with sign switches, because of the poor power factor under which they operate.

It was also found that trouble was being experienced with switches on tungsten lamp loads, due to the inrush current on cold filaments. While the characteristics of the trouble between the poor power factor of the sign transformer and the inrush due to the low resistance of a cold tungsten filament were different, the remedy to obviate the difficulty was found to be the same. That is, a switch of double capacity worked satisfactorily.

Therefore, the 1937 Code, section 3814, will require the use of a T rated snap switch for general use, including tungsten lamps and mercury-vapor transformers. Snap switches used on such lamps and on gas tube transformers, if not rated with a T rating, must have at least twice the ampere capacity of the load controlled.

Now as to the use of circuit breakers on tungsten lamp loads. If the circuit breaker is a true circuit breaker and does not need to be protected by the branch circuit fuse, it may be of the same rating as the load controlled and will operate successfully.

However, if the circuit breaker is one now known also as an "appliance breaker" and one which is approved only for use on a circuit protected by a 15 ampere branch circuit fuse, then it should have a rating of at least twice the amperage of the load. That is, for a 3 amp. tungsten load a 6 amp. appliance breaker, or a "T" rated 3 amp. or a 6 amp. snap switch—not "T" rated.

Service Cable versus Conduit

Q. *"I have noted for some time, articles about the Handbook pertaining to new Code arrangement and how to use it. Will you please advise who is entitled to use it, where it can be obtained and at what price and any other information regarding same will be appreciated."—J.P.H.*

A. There are three Handbooks to which our correspondent may have reference. All are quite handy for the electrician and may be used by anyone desiring information on Code and allied matters—

1. There is the "National Electrical Code Handbook" edited by Arthur L. Abbott and published by the McGraw-Hill Book Co. There is generally an issue of this book for each new issue of the National Electrical Code. This book explains each Code rule and by numerous diagrams, shows how compliance with Code requirements may be made.

2. Another booklet is the "Analysis of the 19—Revision of the National Electrical Code" compiled by A. B. Smith of the National Electrical Manufacturers Association. This was formerly compiled by Arthur L. Abbott, also of NEMA. This booklet is published by NEMA and is also issued for each issue of the National Electrical Code to show the changes, through revision, to the various Code rules.

3. Then there is the "Handbook on Interior Wiring Design." This was compiled by a committee of the electrical industry, under the Chairmanship of E. A. Brand and is published by the committee from the headquarters of the Edison Electric Institue. A series of articles telling "How to Use the Handbook" by Richard G. Slauer, Secretary of this Committee has just appeared in this magazine.

CHAIRMAN JOSEPH P. ROHAN of the Eastern Section, International Association of Electrical Inspectors at his desk in Hartford, (Conn.) city hall wields his official pen as chief electrical inspector. But back in his mind he is turning over the plans for the Eastern Section convention that will be held in his city during September.

Blowing of Primary Fuse

Q. *"I have been a subscriber of Electrical Contracting for some time and think it fine. Now I am coming to your many subscribers for a little information which I hope can be furnished by some of the readers.*

Can you tell me why the ½ amp. primary fuses, at the transformer of a single user, blew on a short caused by a defective cord on any appliance in the house or barn while the 15 ampere branch circuit fuses and the 60 amp. main fuse in the service switch did not blow? In the case at the barn 15 amp. fuses were in the safety switch at the barn and the circuit come from the house through a 15 amp. fuse there, but neither of these blew. What is the answer?

The voltage on the primary of the transformers is 2300 and on the secondary is 110-220. The service wires are 3 #6. There are 4–15 amp. branch circuits in the house and one in the barn and 1–40 amp. range in the house."—H.K.S.

A. The blowing of the primary fuse is undoubtedly due to its being out of proportion with the secondary side fuses. As the service wires are #6 the service fuses should be not over 50 amp. which is the maximum current that may be expected to be used at 220 volts, of course.

If 50 amps. is used, at 220 volts on

Removable Block!

Easier to Install!

Cuts Installation Time!

Reversible Block!

The NEW 7RL4 COLT-NOARK Service Switches

with Removable Reversible Block

The whole idea back of these new Colt-Noark Pull-out Switches is . . . speed and ease of installation. The block is built in one complete unit . . . and out it comes by simply loosening *a single screw!* The cuts at the left show how simple it is to wire the new 7RL4. First a single screw is loosened . . . and you can't lose it because it is fitted with a special collar washer. Then lift out the block . . . and you have an absolutely empty box, with plenty of room for bringing in your wires. With the wiring complete . . . slide the block back into place . . . make your connections and the job is done.

BLOCK IS REVERSIBLE

A feature of the new 7RL4 is the reversibility of the block so that lighting circuits can be connected at the top—often necessary to facilitate wiring and save money. Speed up installations . . . cut down installation costs . . . make sure of a better job . . . and boost your profits by installing these new 7RL4 pull-out switches.

All fuses are accessible through an auxiliary door. Cabinets are furnished for either surface or flush mounting.

Fuse holders may be retained in "off" position by inverting. When inverted, switch blades will not make contact.

COLT'S PATENT FIRE ARMS MFG. CO., Electrical Division HARTFORD, CONN.

100 Years of Manufacturing Experience is back of every Colt Built Product

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SWITCHES INDUSTRIAL CONTROL EQUIPMENT FUSES

Boston
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Inexpensive and Easy to Install.....

BM Connectors and Couplings

WHITE ZINC FINISH

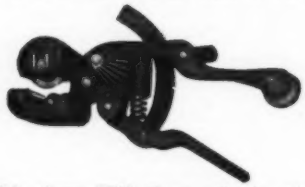
for Electrical Metallic Tubing

The simplicity of installing BM Connectors and Couplings and the dependable results realized make this line particularly appealing to Contractors. The BM Indenter No. 605 does the job exactly right for installing the one-half inch fittings only—just two squeezes on the handles, and the fitting is securely fastened to the Electrical Metallic Tubing. BM Indenter No. 600, with interchangeable jaws, can be used with ½", ¾", or 1" fittings.

BM Indenter No. 605

BM Indenter No. 600

Tube Holder—Handier Than A Vise



Tube Cutter With Reamer—Quicker Than the Hack Saw

BRIEGEL METHOD TOOL CO.

(not incorporated)

GALVA, ILLINOIS

Fittings and Tools for Electrical Metallic Tubing

Listed by The Underwriters' Laboratories

Questions ON THE CODE

[FROM PAGE 54]

the secondary, the current on the primary (without including charging current or core losses) will be approximately 5 amps. This amount of current would naturally be too much for the ½ amp. primary fuse, although it would not blow the 50 (or 60) amp. service fuse, as that fuse is rated to carry that amount of current.

Now let us see what would happen on one of the branch circuits, without any current in use or any of the other circuits. We must remember that a fuse will carry 125 per cent of its rated current indefinitely. A 15 amp. fuse will therefore carry 18.75 amp. A ½-amp. fuse will carry .625 amp. Now assume the 15 amp. fuse loaded up to its full carrying capacity of 18.75 amp. on the 110 volt circuit. The wattage will be 18.75 x 110 which equals 2062.5 watts. On the 2300 volt primary the current for this wattage would be 2062.5 + 2300 which equals .89 amps.

This is the 178 per cent of the rating of the ½ amp. fuse or over 53 per cent above its indefinite carrying capacity. We may, therefore, expect this primary fuse to blow before one of the fuses on the secondary, at any time, whether the excess current is due to a short circuit or to an overload.

Connecting Feeders

Q. 1. *"I just read an article in which the writer states, that 'we refuse to put 15 amp. fuses in residences because it isn't Code.' I have the 1935 Code but cannot find such a rule. How about it?—A.C.B."*

A 1. The reference to the proper size fuse is found in the National Electrical Code in Article 20, Section 2005, which provides that the fuse for a branch circuit shall not exceed 15 amperes. The National Code therefore permits a 15 amp. fuse on a #14 wire branch circuit. But there are some cities which, by their local ordinances, provide that, "the 10 amp. fuse be the maximum size permitted on a branch lighting circuit."

Q. 2. *"Another question I wish to have cleared up. In an installation for a number of small motors, 5hp to 25hp, what is the proper way to connect the feeders to each motor branch circuit switch? By this I mean on all switches the screws and binding post nuts are just large enough for one conductor lug. How then do you continue your feeder from the one side of each switch to the next succeeding switch? In these installations one seldom if ever uses bus bars to tap off of. So what other way is there? The conductor size is the same between all switches.—A.C.B."*

A. 2. It is possible to secure double lugs so that two wires may be connected to a single terminal. Or if single lugs are to be used, it will be necessary to tap a short piece of wire onto the feeder as it passes through the box. It is therefore necessary to select a switch with an enclosure large enough to accommodate this arrangement. Probably suitable solderless connectors can be obtained which will make a neater and more satisfactory job than spliced wires.

Q. 3. *"Also is it permissible to reduce the size of conductor to each succeeding switch when motors are smaller, these switches being placed 2 ft. apart? This information would be greatly appreciated.—A.C.B."*

A. 3. Reducing the size of the feeder after each motor has been tapped off, without interposing a cutout in the feeder, would not be permitted. The feeder protective device would have to be larger than would be permitted to provide proper protection for the circuits of the smaller motors at the end of the feeder, where it would be more than 300 per cent of the rating of the last motor. The same size wire should be used for the entire feeder.

Also, it should be remembered that unless the motor running protective device is a thermal device "which has been approved for group installation" a motor branch circuit protective device must be provided, where these switches are tapped off of the feeder. Also the wire size shown by our correspondent in the sketch is not correct for the motors indicated. The feeder required for 1-30hp, 1-25hp, 1-20hp and 1-10hp motors should not be less than #0000.

***EASY PULLING**—These men are installing four 20-ft. runs of exposed conduit for tying together a new and old panel in a Charleston, W. Va., furniture store. Because there are two 90-deg. elbows, and a double offset at the right to get around a pilaster, each run employs a threaded type "C" condulet fitting at the mid-point. The Schoolfield-Harvey Electric Company lives strictly up to the letter of the Code.*

VARNISHED CAMBRIC • RUBBER POWER CABLES • BUILDING WIRE • RADIO WIRES • SIGNAL CABLE • FLEXIBLE CORDS • LEAD-ENCASED AND PARKWAY CABLES • ARMORED CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

Crescent Wires and Cables are
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A Large Hydraulic Press Extruding Lead Sheath on Power Cable

Here the sole emphasis is placed on the production of wire and cable for electrical use, alone—and every possible operation, from processing raw material to applying the finish, is completed in our plant.

Such specialized manufacturing activity gives full control of quality, impossible to attain by depending upon outside production facilities.

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INSULATED WIRE & CABLE CO. INC.
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Jobber Co-Operation—A Permanent Policy

CRESCENT ENDURITE SUPER-AGING INSULATION • WEATHER PROOF WIRE

Questions on SIGNALLING and COMMUNICATION

Answered by ALBERT A. SCHUHLER

Button Board for Program System

Q. *A school, now using a push button plate for calling class rooms, wishes to install a program clock. The button plate has forty individual circuit buttons and one master button. What changes must be made on the plate and in the wiring?—C. D.*

A. The present push button plate may be used for calling the individual rooms. The master button must be disconnected. All of the back, or normally closed-circuit contact springs, on the individual circuit push buttons, must be disconnected from the common wire now connecting them.

A four-program cross-connecting clock must be added. This will consist of a net-work of brass bars, four vertical bars being used for the program circuits, and forty horizontal bars for the individual circuits. New connections must be made from the back or closed-circuit contact springs, on the push buttons, to the horrizontal or individual circuit bars. The four program buttons on the program clock are each connected to the four vertical bars.

In addition, the same feeder wire now connected to the front or normally open-circuit contact springs, on the individual circuit pushbuttons, must be extended to the four program buttons on the program instrument.

Open-Circuit Thermostatic Fire Detector

Q. *One of our customers wants automatic protection in his residence in the event of a fire in his basement, by operating a bell on the second floor as an alarm. What simple system would you recommend for this purpose?—C.D.*

A. Use a fire alarm system with thermostatic detector units, placing these units in such a way that each will serve a space of approximately 15 ft. x 15 ft. or 225 square ft. For residential work the 135 degree units are recommended.

The method of connection is the same as for a bell system, with all detector units in multiple. Place a push button at some convenient point and connect it in multiple with the detector units, so that occassional tests may be made to insure proper operation of the system. If ac. is available, the system may be operated from a transformer on approximately 24 volts. It would appear that a four inch bell would be sufficiently large and this bell should be of the non-contact type.

Burglar Alarm Window Springs

Q. *Will you explain the proper method to follow in installing burglar alarm springs in standard double hung windows, such as are found in residences? There seems to be some question at times as to where springs are to be located, and how they are fitted into the window frames and sashes.—R.C.*

A. This matter requires a little study, if success is to be had with such installations. But the accompanying sketch should make it clear.

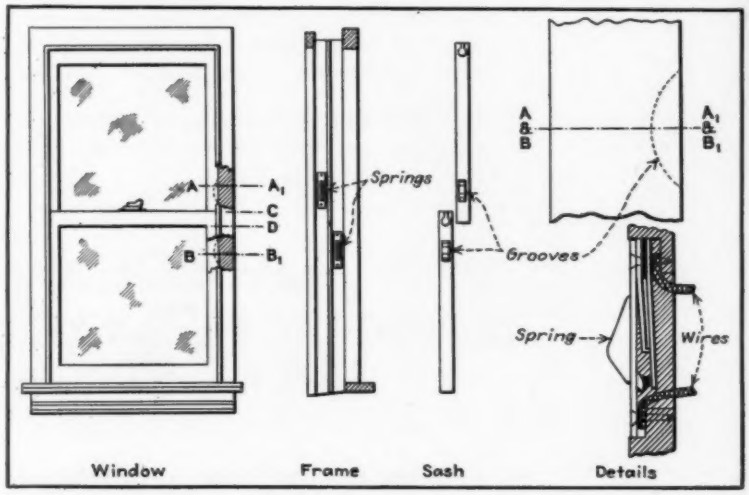
I show a complete window of this type. Cross-sections A-A1 and B-B1, indicate approximate locations of center of spring. The dotted curved line shows the part of the window sash which is to receive the operating cam of the alarm spring. C, is the point from which to measure a distance of approximately 6 inches to the center of cam for the lower sash. This distance may vary depending upon the point where the sash cord is attached.

In any event, the spring must be installed directly below the point of attachment. D, is the point from which to measure a distance of approximately 3 to 6 inches to the center of cam for the upper sash. In this case, the spring may be brought down further than in the lower sash, as there is no obstacle in the path of free operation of the alarm spring. These measurements may require revision, depending upon the design and construction of the sash.

Next is a window frame and the location of the alarm spring. These springs are located as shown, the left hand spring being used for the upper sash, the right hand one being used for the lower sash.

Next are the two window sashes and the location of the grooves, which will receive the cams of the alarm switches, when the windows are closed, or in other words, when they are in a normal position.

Next, the upper portion shows the grooved part of the window sash into which the cam of the alarm spring must fit. The lower portion shows an alarm spring mortised and fitted into the window frame, or weight box. It will be noted that the front of the alarm spring plate must fit flush with the wooden surface. Sufficient stock must remain so that the ends of this

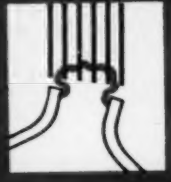


STOP THIEF—*How to install window springs to operate a burglar alarm system from double hung windows.*

"DE-ION MEANS Long Life TO ME", SAYS THE PLANT ENGINEER

● "De-ion," the most important word in motor control language today, has a specific meaning to the Plant Engineer: It means long life with a minimum of maintenance. On jobs calling for frequent operation, or operation at high overloads, the "De-ion" arc quencher divides and extinguishes the arc practically instantly. This high overload capacity results in practically unlimited life of arc box and contacts. For full information, call or write your local WESTINGHOUSE OFFICE ELECTRICAL WHOLESALER MOTOR DEALER

Westinghouse Electric, East Pittsburgh, Pa.



● BUT "DE-ION" ALSO MEANS . .

COMPACT DESIGN
LESS UPKEEP
DEPENDABILITY

Features of Westinghouse "De-ion" Linestarters that are of utmost importance to Operators, Maintenance Men, Designers, and Plant Owners.

Westinghouse "DE-ION" LINESTARTERS

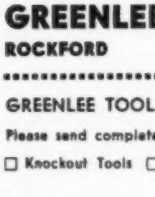
GREENLEE

PROFIT MAKERS For The Contractor

THE greater the efficiency of the tools you use, the more chance you have of meeting competition and making a profit on each job. That is why Greenlee Conduit Benders and Knockout Tools are so popular. They cut costs on every job and are liked by the men who use them.

Hydraulic Conduit Benders

Greenlee Hydraulic Conduit Benders insure profits, because they bend conduit quicker and easier than by other methods. In addition, they make smooth, even bends, eliminating many fittings and making it easy to pull in wire and cable. They are easy to take to the job, too, because they are readily portable.



Knockout Tools

Greenlee Knockout Punches and Cutters are time savers and profit makers, because they make it easy to enlarge holes in switch boxes, cabinets, etc. They form clean-cut holes quickly and accurately, without reaming or filing.

OTHER TOOLS: Hydraulic Pipe Pushers, Ball-Bearing Joist Borer, Electrician's Bits, Bit Extensions

GREENLEE TOOL CO.
ROCKFORD ILLINOIS

GREENLEE TOOL CO, Rockford, Ill.

Please send complete information on the following:

☐ Knockout Tools ☐ Conduit Benders

Name.....

Street.....

City.....

State.....

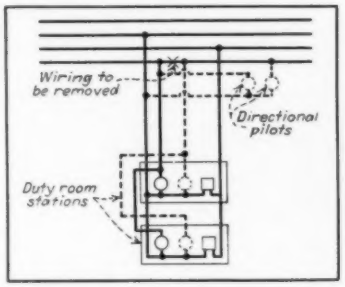
My Jobber is.....8-37

Questions on SIGNALLING and COMMUNICATION

[FROM PAGE 114]

plate may be supported, and the wires may be wedged between this plate and the wood stock. Wood screws are passed through the plate near each end, and these clamp the wire in place.

As stated above, the cam of the alarm spring, in its normal position, fits into the groove provided in the window sashes. As soon as the upper sash is pulled downward, the cam gradually slips out of the groove and rides along the straight surface of the sash. Before it leaves the groove, however, the contacts actuate and cause the alarm to be sounded. Likewise with the lower sash, the same action is accomplished on the other alarm spring.



TUT-TUT!—*In June we ran a diagram for wiring directional pilot lights on a nurses' call system. But in the diagram, on page 82, there was an error in the connections indicated in the duty room station. Here is the way it should have been drawn. Sorry! Ho-Hum!*

Bell-ringing transformers

Q. *(1) The Code states that if approved bell-ringing transformers have inherent current-limiting characteristics, they need not be fused. How is it possible to tell if a bell-ringing transformer has this characteristic?*

(2) If such a transformer does not have the current-limiting characteristic, what governs the size fuse needed to protect it?

(3) How can the average electrician or layman tell whether a bell transformer has this characteristic, so as to know if it should be fused? Most bell transformers do not have the Underwriters Label.

(4) What current does a bell transformer take?

(5) If a transformer is to supply a 30 volt, 30 ampere load from a 110 volt circuit, what size wire should be used to feed the transformer?

(6) What effect would it have to use a 40 cycle transformer on 60 cycle or vice-versa?—F.B.

A. (1) Unless a bell-ringing transformer bears an Underwriters Label, the only way to tell whether it has the inherent current-limiting characteristic, is to check the style and type with the Underwriters List of Approved Devices—the "Green Book." This characteristic is the result of construction, which prevents fire hazard. The chief requirement is that the temperature rise, above ambient temperature at any point on the enclosure of a bell-ringing transformer, shall not exceed 50 degrees Centigrade, when the transformer is operated continuously on a circuit of rated voltage and frequency, with all secondary terminals short-circuited, until constant temperature is attained.

(2) If a transformer does not have the current-limiting characteristic, then it must be fused in accordance with Article 60, Section 6001, Class 2.

(3) This question has been answered to some extent in (1) above. It is true that many manufacturers do not use Label Service on bell-ringing transformers. However, those listed in the Green Book have this characteristic. The transformer may be tested by short-circuiting the secondary leads and inserting a wattmeter to see that it does not exceed 50 watts, which is the limit of this type of transformer.

(4) The Code states that the input to the primary winding of a bell-ringing transformer shall not exceed 50 watts under any condition of use, including the short-circuiting of the secondary terminals. Compliance of a transformer with these requirements shall be determined by applying full-rated voltage, at rated frequency, to the primary winding with the secondary terminals short-circuited. A suitable wattmeter shall be used for measuring the primary input.

(5) This size transformer does not come within the bell-ringing transformer classification, as they are not permitted to exceed 25 volts. Such a transformer would come under the power transformer classification. However, a transformer for signal work, based on the load stated, for practical purposes would have a total load of 30 volts x 30 amperes or 900 watts. The primary voltage being 110 volts, the primary winding would have 900 watts, 110 volts or 8.18 amperes flowing through. This would require a number 14 wire to feed the transformer.

(6) Connecting a 40 cycle transformer on a 60 cycle line would result in satisfactory operation. But connecting a 60 cycle transformer on a 40 cycle line would cause a dangerous rise in temperature.

More than a Fuse!

An answer to the demand for a non-tamperable fuse

Resists tampering and over-fuseing

Can't be replaced by a penny or slug — and it is practically impossible to bridge with tinfoil, strands of lamp cord or any other material.

Stops use of over-size fuses — a 20 or 30 ampere Fustat will not fit in a 15 ampere receptacle or adapter. Similar limitations apply to all other sizes.

Once you have installed the correct size to protect, your protection cannot be taken from you.

But that's not enough . . .

A non-tamperable fuse that would blow on starting currents would be an impractical device—a terrible nuisance—so the Fustat...

Wipes out any excuse for tampering *because* it stops needless blowing . . .

Won't blow when washing machines, refrigerators or other motors start. A 15 ampere Fustat will permit you to load an ordinary circuit to capacity — and yet not blow on motor starting.

It gives you SAFE PROTECTION without USELESS SHUTDOWNS.

Adapter fits Edison base fuse holders and locks in place.
Retails at 7½c

Protects flexible cords against burnout— in spite of its long time-lag

The Fustat contains a fuse. The ability of a fuse to protect against dangerous cord shorts or grounded circuits is well known.

The Fustat
HOLDS like a LARGE FUSE when safety permits,
yet
OPENS like a SMALL FUSE when safety demands.

1. Makes safe protection remain safe

2. Stops loss of money on needless "blown fuse" service calls

3. Permits adding more appliances to present circuits

The FUSTAT

RETAIL PRICE ONLY 7½¢

SUSSMANN MFG. CO.
Gravois at Jefferson
St. Louis, Mo.

SUSSMAN ENGINEERING CORP.
121 Sixth St.
New York, New York

NATIONAL ELEC. PRODUCTS CORP.
Penn Bldg.
Pittsburgh, Pa.

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GOOD FORM!

Sold through wholesalers

Form is important in electrical fittings as well as bathing beauties . . . and that's one of the basic reasons for the wide popularity of Appleton's "35 Line" Unilets. Note the rounded ends of the cover opening and the absence of ear lugs. These two features give you added wiring space and save time and money on many installations.

No-Thread type in all popular styles

"35 Line" castings are made in the Appleton Foundry, which means they get the kind of supervision that produces a perfect job every time. Cast of malleable iron for rugged strength and coated with cadmium to resist corrosion and rust, this line of Unilets is built to do the job right. That's why electricians often say, *"It's a Beauty!"*

Threaded type in all popular styles

APPLETON ELECTRIC COMPANY
1704 Wellington Ave. · Chicago, Ill., U. S. A.

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LOS ANGELES, 340 Astoa St.
DETROIT, 7621 Woodward Ave.
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ATLANTA, 230 Luckie St., N. W.

APPLETON

Threaded and No-Thread Malleable

Standard for Better Wiring

UNILETS

REG. U.S. PAT. OFFICE

Sell Electronic Controls

[FROM PAGE 13]

annunciator wires or a twisted telephone pair are used to connect the units, in place of the power line.

This equipment involves practically no installation problem, requires no maintenance beyond occasional replacement of tubes, and is inexpensive enough for sale to a wide market. The principle of these telephone devices is very similar to that of a radio transmitter, except that the radio wave is sent along wires.

Where to Look for Business

New construction of schools and large offices, where illumination control is important, is a ready opportunity for selling electronic controls. Factories that make use of high-speed continuous processing of materials are often able to reduce shrinkage and rejects by applying electronic process controls, and hence are logical prospects. Any manufacturer whose product depends on color or color-matching needs illumination control and color-measuring devices. Likewise if there is a smoky factory chimney in your town, photoelectric control of the furnace combustion will stop the smoke and increase the efficiency of fuel consumption.

Stores make use of photoelectric cells principally for the control of window displays and for various "trick" arrangements which catch the eye of the passer-by. Restaurants need private telephones for chef-orders, and automatic door-control between kitchen and dining room. The wealthy home-owner is usually burglar-alarm minded; and the more effective the alarm, the better he likes it. His kitchen, living and reading rooms all are good opportunities for illumination control, his garage for a private telephone.

The wiring job on each installation is usually limited to supply and control circuits, since the apparatus itself is contained in a completely wired housing. The length of these circuits and the method of running them depends, of course, on each installation, but in general they are not different from the circuits used with more conventional equipment. Armored cable for enclosed work and lead-sheath cable for exposed locations are commonly used.

The equipment manufactured by the larger companies is supplied complete with wiring instructions which may be followed by any electrician. The job is not difficult from the installation standpoint. The biggest obstacle is the customer lack of knowledge.

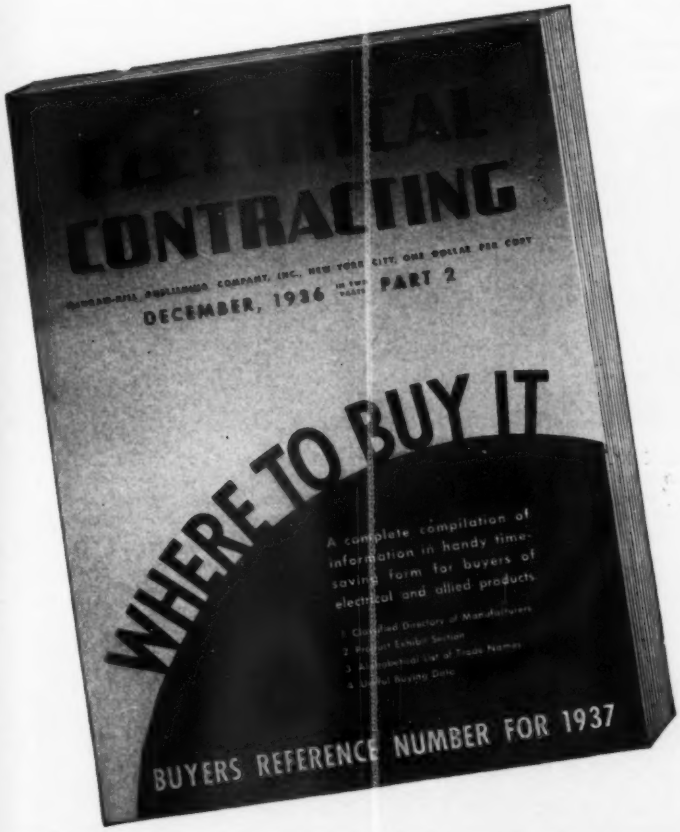
Here is a complete, handy index

of the electrical and allied products of some

3,300 MANUFACTURERS

Alphabetically arranged and supplemented, in many cases, by manufacturers advertisements giving detailed product information.

Keep this book handy — use it in planning your buying — it will save time and money for you!


CONTRACTING
DECEMBER, 1936
PART 2
WHERE TO BUY IT
A complete compilation of information in handy time-saving form for buyers of electrical and allied products
BUYERS REFERENCE NUMBER FOR 1937

The Electrical Buyers Guide for 1937!

●

Revised and Published Annually by

ELECTRICAL CONTRACTING

330 W. 42nd St., New York, N. Y.

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High Lights IN THE NEWS

S. L. NICHOLSON HAS RETIRED

S. L. Nicholson has retired as vice president of the Westinghouse Electric and Manufacturing Company and as treasurer and governor and executive committee

S. L. NICHOLSON—War horse of industry cooperation

member of the National Electrical Manufacturers Association. He has been one of the most active, interesting and colorful personalities engaged in the national affairs of the electrical industry and will be greatly missed by those of all branches, who have known and worked with him so long. But there is a farm in Pennsylvania that has been on his mind for a considerable period and that is something worth retiring for.

Nicholson has been a pioneer of electrical progress for fifty years, a Westinghouse man for forty years, and has devoted almost his entire time for twenty years to industry association work and to the development of electrical standards and markets. In 1908 he was the first president of the American Association of Electric Motor Manufacturers, and later a governor of the Electric Power Club, chairman of the Electrical Manufacturers Council, president of the Associated Manufacturers of Electrical Supplies. He formulated the reorganization plan for the electrical committee of the National Fire Protection Association, tying it in under the American Standards Association. He helped organize NEMA. He was active in the Society for Electrical Development. He is a fellow in the American Institute of Electrical Engineers. In 1925 he received the first McGraw Award Medal given for a contribution to the manufacturing branch of the electrical industry, for his work in the development of a standard uniform electrical ordinance.

Though his activities have naturally fallen in the field of manufacturing, "Nick" as he is known to all the industry, has worked unselfishly for the benefit of the contractor, dealer, wholesaler and power company as well. He has rendered a splendid service and has won a lot of friends by his rugged honesty, his fearless frankness, his sincerity of purpose and his lovable character. He will be ever welcome where electrical men may gather to deliberate on industry problems.

His restless energy may not add to the contentment of the cows down in those Pennsylvania hills, but there will be a new vitality in the dairy business thereabouts. If not—make up your mind, Nicholson is doing something else.

MINNESOTA CONTRACTORS DISCUSS PROBLEMS

Minnesota contractors spent two days turning their problems inside out at Bemidji, in the lake country, July 11 and 12. The Minnesota Electrical Association and the Minnesota Electrical Council combined in a summer conference with the North Central Associated Electrical Industries cooperating.

The State Electrical Law establishing State licenses, was presented and discussed by George M. Jones, contractor member of the State Board of Electricity. The law provides for the licensing of master electricians; journeyman electricians; and special electricians whose work is limited to extensions and alterations to existing installations, in communities under 10,000 population. Utilities are exempted from the law under special provisions.

M. C. Baldwin, of the Minnesota Power & Light Company, of Duluth, outlined the efforts of that utility to aid the contractors in selling farm electrical equipment. George D. Munger, of Washington, brought the program of REA to the meeting, stressing adequate wiring and load building on lines already installed. He said that state-wide inspection will be in effect in twenty states within two months, and a still wider inspection program is now under discussion.

The "Hand Book of Interior Wiring Design" was discussed and compared with the new Code requirements by W. H. Traeger, of the General Cable Company and copies of the Handbook were distributed to the members. Then followed a brief talk by W. T. Stuart, of Electrical Contracting, on the contrac-

DUPLEX WIRE FEST—Anaconda Wire & Cable Co., recently played host to contractors and inspectors of New England, taking them to its Pawtucket, R. I., factory, with eats en route. Following talks on present-day cable development and laboratory tests, the group toured the factory. The Hartford delegation is pictured above, while the lower group hails from New Haven.

"JOBS LIKE THIS DON'T HAPPEN EVERY DAY ..but NOFUZE helps to Sell them!"

WESTINGHOUSE
ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA.

NOFUZE PROTECTION LANDS LOUISVILLE CONTRACTOR $32,000 JOB

There's a money-making "headline" from down in the old Derby Town of Louisville, Kentucky.

You know, the way some contractors have grabbed hold of the Nofuze idea and used it to sell wiring jobs and maintenance contracts knocks into a "cocked-hat" the old theory that contractors think "price" first, last, and always.

This Louisville job was an exceptionally big one, and we're proud of it -- but it was sold just like all the others, where Nofuze has been used to get the sale rolling.

When you take a Nofuze Breaker under your arm, and start out to sell a "tough" prospect, you can be sure you've got the best circuit-protection story there is to tell. But even better -- you can PROVE that time after time, NOFUZE breaker installations save more than they cost, the first few weeks they're installed.

There's a challenge for any red-blooded, sales-minded contractor, and those who are taking advantage of it are plenty ahead.

Check up and see if you are making the most of this profit-opportunity. The boys in our wholesale houses have complete details and PROOF of savings on scores of Nofuze installations. Call them up now. They'll be glad to tell you more about it.

Sincerely yours,

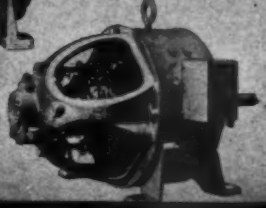
Westinghouse Electric & Mfg. Co.

NOFUZE "DE-ION" CIRCUIT BREAKERS 100% Safety PLUS Important Savings

Every House needs Westinghouse

CS (AC) MOTORS for any constant-speed drive—all sizes and types.

"DE-ION" LINESTARTERS —Most important forward step in entire history of motor control equipment.



SAFETY SWITCHES—Every size and type, with exclusive Westinghouse Diamond-pointed jaw construction.

FROM INCOMING LINE TO DRIVEN MACHINE
Install Westinghouse

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[FROM PAGE 64]

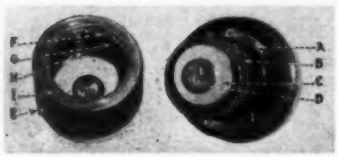
tor's individual job of public relations, and a presentation of the relationship between promotion and profits in appliance sales by A. H. Kessler, field secretary of the North Central Associated Electrical Industries.

Many of the contractors made this meeting a preliminary to their vacations and brought their families. There was a splendid recreational program of golf, boating, swimming, bridge and a banquet, addressed by State Senator A. O. Sletvold of Minnesota, on the Fair Trades Practice Act recently adopted in that state.

AT LAST—A FOOL PROOF FUSE PLUG

Three fuse manufacturers, Bussmann Manufacturing Company, National Electric Products Corporation and Kirkman Engineering Company, have jointly launched the long expected non-tamperable plug fuse. They call it the "Fustat" and since July first it has been on the market in 15 to 30-amp. sizes. The "Fustat" is a simplification of the "Fusetron," for which Bussmann holds patents and has licensed the other two manufacturers.

To put a brake on the dangerous practice of bridging fuses or placing pennies behind them, the 1935 National Electrical Code contained a new clause requiring that plug fuses be non-tamperable after July 1, 1937 and that fuses of different manufacturers be interchangeable. Several fuses have been developed but interchangeability has been hard to achieve, and when the code was revised this spring, the manufacturers were still not ready. So the new code will permit but not require non-tamperable fuses, while dropping the interchangeable feature entirely. But "Fustats" are interchangeable.



NON-TAMPERABLE FUSE—A new non-tamperable fuse plug, proof against the use of pennies as bridges. Any bridging must extend from upper contact bar (A) past screw toothed disc (B), washer (C) to connect with bottom contact (D) because all parts are insulated from each other. In the adapter bridging would have to extend through saw toothed upper ring (F) to center contact (I) which must be pressed down before current flows. Lower metal ring (H) is preceded by an insulated section (G). Adapter is locked in by spur (E).

The "Fustat" is a two element overcurrent protective device which combines a fuse to take care of heavy overloads and a thermal cutout to provide for lag on motor starting currents. Small overcurrents cause the solder in the thermal element to soften, before they become excessive in duration and permit a spring to pull the fuse link out and open the circuit.

The non-tamperable feature is provided by means of an adapter, which screws into the present Edison cutout base and has a spur that makes it impossible to remove the adapter without destroying it. Different pitches to internal threads of the adapter prevent its use for fuses of sizes larger than its rating. "Fustats" of different ratings have different pitch threads to fit the proper adapters, so that it is impossible to use a 20 to 30-amp. fuse in a 14-amp. adapter.

Easy tampering is also made difficult by the "Fustat" design. It not only prevents the insertion of penny or slug, but a spur at the bottom of the device pushes aside any metal device that might be used for bridging.

"There's a fuse box back there some place—you're the electrician, not me!"

REA LOANS 50 MILLIONS

When its allotment books were closed for the current fiscal year, REA had earmarked $46,499,482 out of $50,000,000 made available for rural electrification project loans this year. The allotments cover 60,000 miles of lines, to service 200,000 rural customers.

Prior to the passage of the Act of 1936, REA approved projects totaling $14,612,628 under emergency authorization, for 337 specific projects in 41 states. Loan contracts total $52,560,207, construction bids let or pending $41,427,620, and contracts awarded for which $25,822,743 may be lent. The Treasury has paid out more than $10,000,000 for work completed.

Recent allotments reported by the Rural Electrification Administration are—

Alabama—$254,000 to a cooperative now being organized to serve sections of Pike, Coffee, Crenshaw and Covington Counties.

Arkansas—$89,000 to the Farmers Electric Cooperative Corporation, Newport, to serve Jackson County.

Arkansas—$88,000 to a cooperative now being organized to serve Woodruff County.

Arkansas—$200,000 to a cooperative in Johnson County, to build 491 miles of line.

Colorado—$4,000 to finance house wiring and plumbing in the Grand Valley Rural Power Lines, Inc., Grand Junction, and to build 139 miles to serve 638 customers.

Georgia—$3,000 to the Troup Rural Electrification Corporation, La Grange, to build 77 miles to serve 400 customers.

Georgia—$16,375 to the Carroll Rural Electric Association, Carrollton, to finance house wiring and plumbing and to build 108 miles of lines to serve 538 customers.

Iowa—$22,712 to the Eastern Iowa Light and Power Company of Davenport for a project in Scott and Muscatine Counties.

Iowa—$75,000 to the Franklin Rural Electric Cooperative, Hampton, for the first unit of its 418-mile project.

Kentucky—$40,000 to the Henderson County Rural Electrification Association, Henderson, to finance house wiring and plumbing for approximately 400 customers.

Kentucky—$50,000 to a cooperative now being organized to build electric lines in Garrard, Marion, Boyle, Mercer, Lincoln and Washington Counties.

Minnesota—$1,625 to finance house wiring and plumbing installations for the Douglas County Cooperative Light and Power Association of Alexandria.

Mississippi—$47,000 to the Monroe County Electric Power Association, Amory, to build the third section of its project, in Monroe and Lowndes Counties.

Virginia—$10,000 to the Farmers Rural Utilities, Incorporated, Bowling Green, to finance house wiring and plumbing installations for about 100 customers.

"EXPOSITION EXTRAORDINARY"

"Electrical Exposition Extraordinary" is the title to be given to a manufacturers' exhibit of wiring materials, devices and supplies held in conjunction with the convention of the National Electrical Contractors Association in Los Angeles in October. The Electrical Development League of Southern California has thrown its full weight behind the exposition, to capitalize upon the publicity value of the national convention.

This exhibit, planned by a committee headed by A. L. Stone, executive committeeman of NECA, and president of the Los Angeles Electrical Contractors Asso-

KILLARK
ST. LOUIS

. . . IN KILLARK MALLEABLE CONDUIT FITTINGS . . . THERE'S *Flexibility*

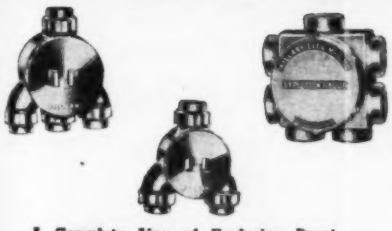
TOO!

• Flexibility that counts with Mr. Contractor everywhere — flexibility plus all the advantages of ordinary fittings. Killark Conduit Fittings will give, stand strain, and will not break —such supple construction makes them easier to work with—such advantage means quicker and more efficient installations.

Remember, too, about these fittings—they are flat back fittings so that they fit snugly against wall or ceiling, they help to line up conduit, and they stay put.

Made in a complete range of sizes and styles. Listed as standard by Underwriters' Laboratories.

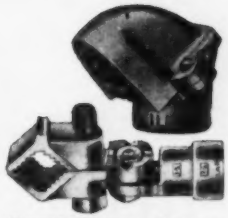
Factory warehouse stocks in fifteen cities.



A Complete Line of Explosion Proof Fittings and Unions

Threaded and Threadless Bodies in Every Hub Combination for ½" to 6" Pipe

Vapor Proof Fittings



Ground Clamps, Entrance Heads and Elbows

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Outstanding!

THE BURNDY SERVIT

THE SERVICE CONNECTOR WITH FORGED-IN STRENGTH

Made in 13 sizes for No. 10 solid wire to 1000 Mcm stranded cable • Corrosion-resistant • Low in cost • Installed in a minute • High Wrench Torque Resistance

BURNDY ENGINEERING COMPANY, INC.
459 East 133d Street, New York, N. Y.

No. 285 DOUBLE DUPLEX RECEPTACLE NOZZLE

The most attractive, compact and easy-to-install fitting on the market. Shown in illustration with No. 200 Cover Plate.

EASY TO SELL

EASY TO INSTALL

at a Profit

No. 110 "LATROBE" WATERTIGHT BOX

Cut-away view of No. 110 Box showing how the tapered unit receptacle fits tapered opening in top of box body. The last word in design, appearance, and simplicity of installation.

A Complete RESIDENTIAL, COMMERCIAL, INDUSTRIAL Line

"Latrobe" FLOOR BOXES

WRITE for CATALOG

AND WIRING SPECIALTIES

FULLMAN MFG. CO. LATROBE PENN.

High Lights IN THE NEWS

[FROM PAGE 106]

ciation, will be open both to the public and to the contractors who visit the convention. It will be staged in the Biltmore Hotel. Tentative plans are afoot for a special meeting in which the story of adequate wiring may be dramatized to the public. An all industry committee is working with Mr. Stone on the convention and exposition arrangements.

NORTH CAROLINA TALKS CODE

Registration at the semi-annual meeting of North Carolina Electrical Contractors at Wrightsville Beach, June 21-22 reached almost one hundred.

A discussion of uniform electrical codes occupied the most of the second day's session, led by C. S. Whitaker, chief electrical inspector of Durham. The electrical men discussed ways and means of putting special ordinances aimed at safeguarding life and property into everyday language so that those unacquainted with the electrical profession might understand and benefit by them. Examination for contractors' licenses were held at the close of the session by N. E. Canady of Raleigh, State electrical engineer, and the State Examining board.

F. E. Hartis of Durham is president of the contractors' association. The next meeting of the North Carolina electrical group will be held in Raleigh in January.

BAY STATE PIONEER PASSES

Willard B. Cookson, a pioneer New England contractor passed away on June 6, 1937 at Needham, Mass. He was 61. Mr. Cookson served as Inspector of Wires in the Town of Needham from 1908 to 1913, and was also Superintendent of Fire Alarms. His contracting business was run under the name of W. B. Cookson, in Roslindale, Mass.

COMING MEETINGS

International Association of Electrical Inspectors — Southwestern-Northwestern Sections (Joint Meeting) Salt Lake City, Utah, August 23-25.
Eastern Section, Hartford, Conn., Sept. 20-22.
Western Section, Chicago, Ill., Sept. 20-22.
Southern Section, Atlanta, Ga., Week of October 4.

Illuminating Engineering Society — Annual Convention, Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 27-30.

National Electrical Contractors Association — Annual convention, Biltmore Hotel, Los Angeles, Calif., October 18-21.

American Welding Society — Annual Meeting and Welding Exposition, Atlantic City, N. J., October 18-22.

Electrical Maintenance Engineers — Annual Show, Lighting Institute, Chicago, Ill., Oct. 20-22, 1937.

Send for this NEW DATA

This recent literature, issued by leading electrical manufacturers, has been listed by number for your convenience. Please check on the post card any of this material you would like to receive. It will come to you without cost or obligation.

LIGHTING UNITS

1. Catalog No. 5-A consisting of 64 pages of illustrations, detailed data, diagrams, tables on reflectors, fittings and lighting units for industrial and commercial requirements. Catalog available in two sizes,—8½" x 10" and 5" x 6¾". Quadrangle Mfg. Co.

RELAYS AND SWITCHES

2. An eight page folder on "Diamond H" mercury tube relays and switches. Description, illustrations, assembly diagrams, list prices. The Hart Manufacturing Co.

CONTROLS

3. A 16-page spiral bound sales brochure entitled "Built to Endure," illustrates and describes mercoid controls for automatic heat, the Sensatherm thermostat, Pyratherms, line safety controls, limit and low water controls for steam boilers, temperature limit controls, warm air furnace controls and sealed mercury contact switches. Mercoid Corporation.

DETACHABLE INSTRUMENTS

4. A ten page illustrated catalog section describing new line of detachable instruments for outdoor and indoor service. Includes complete price list, outline dimensions, application data, economic advantages, construction details of socket and instrument, testing facilities, wiring diagrams. Section 43-600 Westinghouse Electric & Manufacturing Co.

INDUSTRIAL PHASES OF V-BELTING

5. A handbook of useful V-belt information, listing standard sizes and prices for multiple belt and fractional horsepower use. Also tables of standard drives for various ratios and engineering data for designing special drives. L. H. Gilmer Co.

INSULATED CONNECTORS

6. Bulletin No. 4050 illustrating and describing Burndy insulated connectors for tapeless, solderless tapping where space is limited. Burndy Engineering Company, Inc.

ELECTRONIC TIMER

7. Bulletin P-203, covers Type TD240 of Dunco Electronic timer with illustrations, details, prices. Struthers Dunn, Inc.

TEXTILE MOTOR

8. Bulletin GEA-1557A describes and illustrates the screenless open textile motor. Polyphase, 7½-10 and 15 horsepower, ballbearing. General Electric Company.

FUSES AND CLAMPS

9. Folder 3700-CB points out how costly wasted kilowatts are, and how TRICO powder-packed renewable fuses and Kliplok clamps eliminate this loss. Trico Fuse Mfg. Co.

TACHOMETERS

10. Bulletin 1510, a 12-page folder describing Frahm Vibrating-Reed tachometers, for permanent mounting and for hand use. Gives characteristics, illustrations, diagrams and installation pictures. James G. Biddle Co.

LIGHTING EQUIPMENT

11. Catalog No. 20-B outlining commercial and industrial lighting equipment. Includes listings, specifications, illustrations, list prices. Smoot-Holman Company.

LAMP GUARDS

12. Catalog No. 37 consisting of 16 pages giving detailed information and illustrations on safety handles, portable guards, insulated guards, safety plugs, rubber sockets, extension cord sets, safety test sets, vaporproof lamps and plug protectors. Ericson Manufacturing Co.

DOOR CHIMES AND SIGNAL DEVICES

13. Price sheets on door bells and buzzers, door bell transformers, door chimes and heavy duty bells, with illustrations and details. Liberty Bell Manufacturing Co.

STA-WARM EQUIPMENT

14. A folder giving information on Sta-Warm equipment for electrically heating and maintaining heat. Includes wax pots, pouring heaters, soldering irons, thermostatic compound tanks, flexible metallic heated hose, solder pots and wax dropper on stand. Sta-Warm Electric Company.

SOUND EQUIPMENT

15. A folder on sound amplifying equipment including parabolic baffles, microphone stands, baffle stands and fixtures, driver units, trumpets, wall speaker enclosures, banquet and desk stands, demountable baffles, P. A. amplifiers and field exciters. Atlas Sound Corp.

LIGHTING

16. A booklet of 112 pages on lighting units and equipment for theatres, motion pictures, photo studios, universities, schools, churches, stores, window displays, hotels, night clubs, dance halls, restaurants, pageants and fairs. Includes many photographs, distribution curves and diagrams. Century Lighting, Inc.

SPLICES AND TAPES

17. Revised edition of book "splices and Tapes." Includes chapters on "Importance of a Perfect Splice"; "Requirements for a Splicing Compound," "Requirements for Adhesive Tape" and "Instructions for Joining." The Okonite Company.

ELECTRICAL STEEL SHEETS

18. A 32-page booklet on electrical steel sheets for water transformers, etc., giving general function, explanation of terminology, production, testing, consumption, application of various grades and conversion table. Descriptive Bulletin No. 1. Carnegie-Illinois Steel Corporation.

ARC WELDED DESIGN CHART

19. A data chart on arc welded designs, includes illustrations and particulars regarding 16 types of joints for arc welding, sketches explaining nomenclature of welds, tables giving properties of base metals, weld metals, electrode metals for hard facing, also latest approved symbols of American Welding Society. Chart is 24" x 35½". Fitted with metal strips across top and bottom. Lincoln Electric Co.

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SLIP RING MOTORS

20. Form 1032, illustrating and describing slip ring induction, polyphase motors, 1 to 350 hp. for any application for which characteristics of a wound rotor motor are suitable. Century Electric Co.

FIXTURES, LAMPS AND URNS

21. Catalog No. 39 consisting of 50 pages of detailed information on Permaflector suspension type and ceiling type surface mounted fixtures, floor lamps and urns. Many illustrations of equipment and also installation pictures. Pittsburgh Reflector Co.

AUTOMATIC LINE SPLICE

22. Bulletin No. 4039, entitled "The Burndy Splicit," describes the features and application of this automatic line splice. Burndy Engineering Co.

INDUCTION MOTORS

23. Bulletin sheet describing method of integrally-casting end rings, fans and rotor bars for alternating current squirrel-cage induction motors, whereby all possibility of bad contacts or loose connections is eliminated. Reliance Electric & Engineering Co.

BUSBAR DISTRIBUTION

24. A 24-page folder on the busbar method of electrical distribution for industrial plants, commercial buildings and general institutions. Includes many typical installation pictures, diagrammatic layouts and specifications. Bull Dog Electric Products Co.

BIFURCATOR

25. A 4-page folder outlining and illustrating the Bifurcator, for use wherever gases are injurious to motors. Gives diagrams and installation pictures. DeBothezat Ventilating Equipment Division, American Machine and Metals, Inc.

PROTECTION OF WELDERS

26. A 28-page booklet entitled "Health Protection of Welders" discusses types of welding and lists four principal hazards that are encountered—electric shock and burns, radiant energy, gases, fumes and dust, and miscellaneous. Protective measures are outlined and methods of treatment considered. Metropolitan Life Insurance Co.

FURNACE RECORDER

27. A catalog of 100 pages on cable Analy-Graph by which furnace atmospheres are measured to control scaling, descaling, carburizing, decarburizing. Brown Instrument Co.

TEST FOR ACID RESISTANCE

28. A publication "Test for Acid Resistance of Porcelain Enamels," of interest to manufacturers, distributors and users of porcelain enameled products. Includes description of "room temperature test" and "boiling test." Complete instructions given under each classification for simple methods of determining acid resistance of porcelain enamels. Porcelain Enamel Institute.

AMBER

29. A folder entitled "Amber—Twenty Million Years in the Making." Outlines properties, machining and polishing, description, prices, and uses for electrostatic instruments, quadrant and string-electrometers, insulating ionization chambers, in radio practice, standard air condensers, X-ray practise, photography, and general electrical use wherever insulation is required. Amber Mines, Inc.

CABLE ACCESSORIES

30. A catalog of 100 pages on cable accessories with instruction for installing. Dardelet threads discussed and Everdur junction boxes described and catalogued. Anaconda Wire and Cable Co.

CIRCUIT BREAKER

31. Loose leaf sheet No. GEA-2603 describing type FK-45 indoor oil-blast circuit breaker especially designed for the new 75,000-kva interrupting rating. General Electric Company.

GUIDE FOR METAL WORKERS

32. A booklet directed to independent sheet metal fabricators presents sales material and tables, as well as fabricating hints. Includes many photographs taken in typical fabricating plants and sheet metal shops, list of products for use in building air conditioning ducts, tanks, trays and conveyors. United States Steel Corporation Subsidiaries.

WHEELABRATOR TUM-BLAST

33. Data Book No. 211, on the Wheelabrator Tum-Blast gives information on airless abrasive metal cleaning. Includes photographs and descriptive material. Installation views show its application in many types of industry. The American Foundry Equipment Co.

AIR CONDITIONING

34. A booklet entitled "How to Buy Air Conditioning," gives information on the five jobs that air conditioning must do—provide comfortable temperatures, healthful humidity, clean air, proper circulation and adequate ventilation. Discusses factors involved in purchasing the type of system best suited to installation, methods of control and cost of operation. Westinghouse Electric & Manufacturing Co.

LIGHTING FIXTURES

35. A folder describing Lightmaster, indirect lighting units for the home. Specifications and many illustrations. Silvray Lighting, Inc.

TOOLS

36. A catalog of tools and equipment for installation of underground and overhead electric cables. Describes and illustrates conduit rods, mandrels, hammers, cutters, scoop, cleaner, reel jack, feeder, benders and other types of tools and equipment. T. J. Cope, Inc.

V-BELT REPLACEMENTS

37. Book No. 795, covers applications for Rockwood Single Groove V-Belts, for replacement on pumps, stokers, oil burners, heating, ventilating and air conditioning units, woodworking and machine tools and compressors. Rockwood Manufacturing Co.

SOLENOID STARTER

38. A booklet called "The Story of the Solenoid Starter." Gives questions and answers and numerous sketches, defining differences between solenoid type motor starter and conventional clapper type starter. Many typical applications of solenoid motor control are illustrated. Allen-Bradley Co.

CORROSION REMOVER

39. A sheet telling the advantages of NoKoroso, an oil for removing corrosion from battery terminals. It forms a protective film that prevents subsequent corroding. NoKoroso Company.

POLE TYPE CAPACITORS

40. A booklet describing in detail, pole type capacitors for power correction of distribution systems. Catalog 139A. Cornell-Dubilier Corp.

CIRCLE NUMBERS-SIGN-AND MAIL

ELECTRICAL CONTRACTING — **August**
(Not good after November 1)

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HOW TO RUN A LATHE

A machinists' manual on "How to Run a Lathe" containing 160 pages of latest information about fundamental operations of modern lathe practice. Instructions on every phase of lathe work, accompanied with more than 300 illustrations. Price 25 cents each. South Bend Lathe Works, South Bend, Indiana.

LATHE OPERATION

A manual of lathe operation and machinists' tables. Covers lathe care and construction, cutting tools, machining of various materials, holding work, drilling and boring, thread cutting, lathe attachments and their uses, wood-turning on metal lathe, machinists' tables. Many illustrations. Price $1.00 per copy. Atlas Press Company, 1822 North Pitcher St., Kalamazoo, Mich.

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More GOSSIP

Machine Skill

New men start learning about machine work when they enter the motor repair shop of the Robertson Electric Construction Co., Buffalo. Shop superintendent Witschi says every mechanic must drill and tap holes and do many other similar jobs later on, so he begins with mechanical training.

Another Anniversary

When the Jenkintown and Glenside (Pa.) Electrical Construction Co. reached its twentieth year in business, H. B. Scott and Herbert Leswing blossomed forth with a two-page news and picture story in a local paper to celebrate the occasion. Feature photos included the 15-man staff, and several modern trucks. And it is mainly done by specializing on better residence wiring, alterations and trouble service.

LOOKING AHEAD — William A. Millen, who operates the Millen Electric Co. in Windsor is forever planning some association activity for his Canadian co-workers. Art was chairman of the recent midsummer Convention of the Ontario Electrical Contractors Association that was held in Windsor June 14 and 15. He is serving his second term as president of the Essex County Builders and Contractors Association (comprising all local building crafts); has had charge of the last ten Electrical and Radio Shows in Windsor; he is on the executive committee of O.E.C.A. representing western Ontario, and he is also chairman of its legislative committee. Art is a graduate of Queens University, Kingston, is a registered professional engineer, began in the electrical industry 20 years ago, and still thrives on work.

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Simplifies winding of popular sized coils! Heads adjustable to any length or width in 5 to 10 minutes. Eliminates soldering end of each coil. Low initial cost quickly saved, after which equipment pays dividends for years and years. Easily and quickly adjustable for different coil sizes and types. Simple, easy to operate. Takes the place of a multitude of makeshift wooden forms.

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Use this book for :

- Practical suggestions for locating motor troubles—
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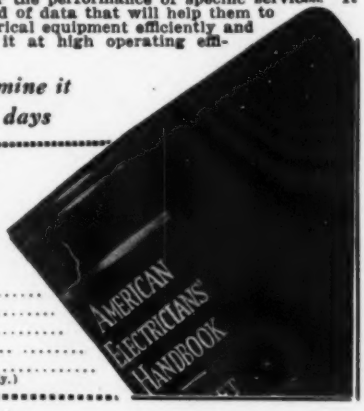
CROFT'S American Electricians' Handbook has become world-famous. Nearly a hundred thousand practical electrical workers know and respect this great pocketbook of practical electricity. It presents the kind of information that helps practical electrical men —wiremen, contractors, linemen, plant superintendents, operators and construction engineers—to select and install commercial electrical apparatus and materials intelligently for the performance of specific services. It gives the kind of data that will help them to operate electrical equipment efficiently and to maintain it at high operating efficiency.

Examine it 10 days



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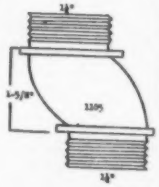

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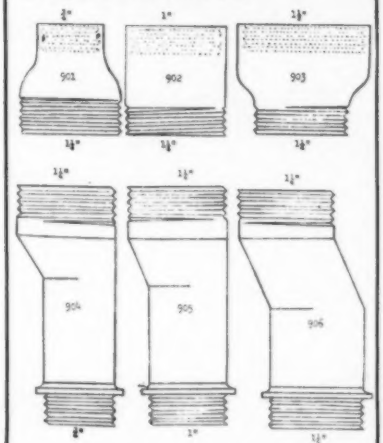

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Sorgel air-cooled transformers save money. Not alone does the installation cost less, but by supplying the proper and most efficient voltage for each type apparatus, from one service, continual savings are effected. Ideal for obtaining 110 volts for lighting, portable tools, etc., from 220, 440 or 550 volt, A.C. power circuits.

There is a size and type for every purpose. Stock sizes ¼ to 50 Kv-a—other sizes to order. Approved by the Underwriters.

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SORGEL AIR-COOLED TRANSFORMERS

More GOSSIP

Underground Specialist

Having given special attention for years to underground construction work, the Terrell Electric Co. of Chattanooga, Tenn., has done a considerable volume for utilities which have their own construction organizations. At present this company is busy with a $17,000 traffic signal installation for the city of Chattanooga.

He Uses It

Several years ago two 200-watt fixtures did the trick in the Colonial Electric Co's. quarters, while today there are three 500-watt units for the same office space. "It's nice," says William E. Raney, "and really lives up to what we preach to our Cleveland customers."

HATS OFF—C. D. W. Anderson of Dayton, one of Ohio's oldest contractors, has just completed 33 years in the business. Walter Becky, at the right, is General Electric vapor lamp salesman, who lured Mr. Anderson into position for a photograph, at the vapor lamp exhibit of the Graybar Industrial Exhibit in Dayton. Anderson has installed 450 more vapor lamps for a recent addition of the Monarch Machine Tool Company, Sidney, Ohio, providing 45 foot candles.

Speedy Production

Just to give us something to shoot at, P. M. Potter of Potter & Rayfield, Inc., Atlanta, cites some smart production figures for rewinding a 50 hp., 900 r.p.m., 72-slot stator. To wind loops and make coils, 4 hrs.; tape, sleeve and prepare coils for winders, 4 hrs.; prepare slot insulation, winding and connecting ready for dip and bake, 7½ hrs.; total time 15½ hours. This was recently done in Atlanta, says Mr. Potter, and a good job it was too. Several shopmen say 35 hours is a fair average for this size job.

For

Residence Wiring

The Best and Safest Method is a properly installed KNOB and TUBE job. Be sure and get the

TRADE MARK **Bull Dog** REGISTERED

Assembled Knob because it "HAS A GRIP LIKE ITS NAMESAKE."

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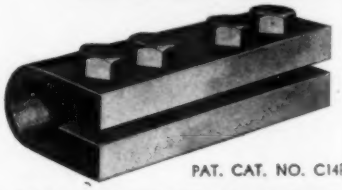
Solderless Terminal LUGS and connections



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YOUR jobbers' salesmen will supply you with Hazard Wires and Cables for your electrical needs. Hazard Armortite Underground Cables are extensively used for city, park and airport lighting . . . Hazacord All-Rubber Portable Cords stand up under hard service and abuse . . . Hazard Entrance Cables (Types SD, ABN and UBN) offer a complete range of pole to meter connections . . . Hazard Firekrome Safecote Building Wires are insulated with Performite, a super-aging rubber insulation or the well-known Hazard Standard 30% insulation as well as with Hazacode (National Electrical Code Standard) . . . Ask your jobber about them.

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Guarding the Archives

[FROM PAGE 9]

son is under the jurisdiction of a division chief, whose office is located close to his zones. Control apparatus, consisting of sound testing switches and supervisors meters, is at the elbow of the division chief, allowing him to remove and establish protection on his division, and to make the necessary tests associated with the door contact and sound detecting circuits.

The sound detecting circuits terminate in a vacuum tube amplifier, which intensifies the sound signal received by a detector, should noise above a specified noise level be received by the detector after protection has been applied to the zone Each of the 154 zones has its own individual amplifier and alarm relay, thus allowing annunciation of alarms by zones at the control center and the associated printing recorder at the control desk. The amplifier alarm relay contacts, and the door contacts, in each zone, are connected in series, so that either abnormal sound noise, or attempted entry into the stack areas through a protected door will initiate the individual zone alarm signal.

Routine opening and closing signals are originated by the division chief, when he removes protection in the morning, and applies protection at night, by operating the "On-Off" switch at his control cabinet. One divisional control cabinet is provided for each of the sixteen division chiefs. One additional cabinet is provided for control of the photo-electric protection at the exhibition hall.

Shows All Zones

Any abnormal condition in any of the individual zone circuits or the protected or non-protected condition of any of the sixteen zones is indicated at the control desk. A duplicate of the supervisory meter, located in the division chief's control cabinet, is mounted on the door of the guard room control cabinet. This indicates to the desk attendant the condition of the doors during the day and the operation of the sound test previous to closing the division at night. A power switch is also provided on the division control cabinet, in order to remove power from the amplifier circuits during the day. The sound signal therefore cannot be initiated during the non-protected period.

The combined silencing and acknowledgment of all signals is accomplished by a single key-switch on the desk control panel. Another key-switch restores the individual zone alarm circuit. A third key-switch, located on the same panel, shunts out action of the sound protecting circuits, during the periodical bell tests, which are made during the protected period. Battery and sub-basement door supervision is also provided from this panel, with an individual meter, associated to show the condition of the circuit.

All of the systems receive their power supply from groups of batteries, which have a total capacity of 350 ampere-hours. A 200 ampere-hour battery has a total of 48 cells, arranged in two groups of 24 cells and connected in series multiple, with an output of 48 volts. This battery furnishes power for the gong circuits of the manual fire alarm system and for the supervising and operating circuits of the burglar alarm system.

A 50 ampere-hour battery furnishes current for the amplifiers used in the burglar alarm system. These amplifiers detect extraneous noises in the areas protected by the microphones. The 100 ampere-hour battery furnishes current to patrol, manual fire alarm and automatic fire alarm systems. A separate Westinghouse dry-plate rectifier is furnished for each battery, which maintains a floating charge on each battery at all times. In addition, the chargers are equipped with facilities for a heavier charging rate.

More GOSSIP

Wandering Expert

Westchester County, New York may seem a long way for a Cincinnati motor expert to travel to render service. Yet Frank W. Willey of the Willey-Wray Electric Co. had to go there some time ago, to supervise placing in service a 32-kw. carbon-arc therapeutic lamp, which he helped design for a large hospital. That is covering territory.

Lectures in Buffalo

The Electric League of the Niagara Frontier held a series of six weekly lecture meetings at Buffalo, to discuss interior wiring design. Richard Wahle, chairman of the wiring committee, says "A new tool to build up wiring business for electrical contractors has been developed, but like other tools we must first learn to use it before we can expect to get any benefit from it. That tool is the new "Handbook of Interior Wiring Design." Each of the lectures was presented by a specialist in the fields discussed.

Exposition Firster

Victor Lemoge, electrical contractor of San Francisco, has the distinction of being first at the site of the Golden Gate International Exposition. He was also first to do electrical work on Yerba Buena island, preliminary to the San Francisco-Oakland Bay Bridge job. Power lines were rerouted by him and service provided to the general contractors, who began the earth moving for the approaches and tunnel on the island. On the fair site he is likewise running temporary service for building construction.

ALL-ROUND SERVICE — There is little that can't be done electrically for customers of the Barker Fowler Electric Co. of Lansing, Mich. This 25-year company houses in its 5-story and 17-000-sq. ft. quarters a complete motor service shop, a fine home appliance sales room, display room and sales counter for commercial and industrial staples, and many rows of well-filled stock shelves. W. F. Baker, at left, runs the motor shop and the industrial equipment end, while B. C. Fowler looks after contracting, sales, engineering and general office affairs. There are usually about 30 employees, not counting from 25 to 150 men in the construction department.

Motor Count

An advance report of the United States Census of Manufacturers for 1935 shows that 2,565,627 split-phase motors of 1/20 to 1 hp. valued at $15,819,451 were made in that year. Larger motors, from 1 to 200 hp. were manufactured to the tune of 224,-321, at a total value of $20,202,770. The production of repulsion-induction fractional horsepower motors for 1935 was 542,862, valued at $7,148,032. Total production of motors was $71,957,147, an increase of about 75 per cent over the previous census report covering 1933.

Thriving Shops

Although Raleigh, N. C., is a relatively small city, there is an expansion program under way in the local service shops of the Electrical Equipment Co., Inc., and the Electric Motor and Repair Co., both companies having outgrown rather spacious original quarters.

UMI

The Conduit That Never Fights Back

Youngstown Buckeye Conduit is like an extra helper on the job. Uniformly ductile, foot for foot, it will take a bend from the hickey without argument—and stay put. When the whole job is finally laid up, it will have that workmanlike appearance that owners rightly judge by.

Youngstown Buckeye Conduit is manufactured throughout by one organization. From the ore in the earth to the satin-smooth lacquer lining in the finished product, there is absolute control which allows no variations.

Clean threads, full cut, require no chasing. Uniform ductility and tensile strength make uniform bends possible, and without a flattening on the inside of the radius. The lacquer lining is as ductile as the metal, and so bends smoothly, with no flakes left to snag wires.

Bid on Youngstown, buy Youngstown—and know you will be backed up by a product that works with you for a better job and more certain profit.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels • **GENERAL OFFICES** • **YOUNGSTOWN, OHIO**

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YOUNGSTOWN

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News of NECA

REPRESENTATION ON ELECTRICAL COMMITTEE

The Board of Directors of the National Fire Protection Association, on June 21, authorized three alternates for each of the two voting principals in the delegation of the National Electrical Contractors Association. This action increases the total NECA representation on the Electrical Committee from four to eight. It will permit a more effective allocation of assignments to Article Committees charged with the responsibility of preparation of revisions of the Code between the bi-ennial meetings of the Electrical Committee.

ELECTIONS AT NATIONAL CONVENTION

At the coming NECA convention in Los Angeles on October 18th to 21st the following officers will be elected:

President, for two years
Vice President, for two years
Executive Committeemen, for three years, from the following divisions:

Division 1, Me., N.H., Vt., Mass., R.I., Conn.
Division 4, Ohio, W.Va., Ky.
Division 7, Minn., Ia., Mo., No. Dak., So. Dak., Neb., Kan., Colo.
Division 10, Wash., Ore., Ida., Mont., Wyo., Utah.

The manner of election is provided in the Constitution of the National Association as follows:

Nominations for President and Vice President may be filed by any member, such nominations to be in the hands of the Secretary at least 30 days prior to the date of the annual convention. No one shall be nominated for President or Vice President unless he shall have served as a member of the Executive Committee. Members present or represented by proxies at the convention shall vote on such nominations. The Committeemen elected by each Division shall be nominated and elected at the convention by official delegates, members and proxies present from the respective Divisions.

Voting Procedure—Chapters of NECA have the right to send a delegate or delegates, properly accredited, who shall be entitled to cast the vote of each member of their chapter in good standing. Members of the Association who are not members of any Chapter may vote by proxy by designating on an official proxy form, a member of the National Association to cast their vote. Official proxy forms will be mailed by the National Secretary to the Chapters and to all individual members at least 45 days before the convention.

CONVENTION PROGRAM

Seven business sessions are scheduled for the four days of the National convention of NECA at the Biltmore Hotel in Los Angeles in October, plus a fine program of entertainment for both the convention delegates and their ladies. Notable industry leaders have been selected to present the many angles of business development to be covered by the program. Following each speaker discussion of each particular problem will be open to the convention. Some of the subjects to be discussed are as follows:

Electrical Industry Promotion Program
The National Adequate Wiring Program
Qualified Contractors and Utility Cooperation
Electrical Industry Fair Trade Policy
The Customer's View of Electrical Service
Apprentice Training
Going After the Wiring Market
Industrial Modernization
Organization of the Motor Shops
Highway Lighting

CODE PRINTED FOR COMMITTEES

At the suggestion of Allan Coggeshall, NECA member of Electrical Committee, N.F.P.A., a limited number of copies of the revised 1937 Code have been made up from the printer's proofs of the Code. They are for the use of Electrical Committee members and members of other Code committees, who desire a working form for recording notes for revisions di-

35 YEARS AGO

KILLYWHAT wasted a customer cigar on father-and-son callers, only to learn that because the 18-year offspring had failed on six jobs, papa as a last resort offered his nitwit boy as an electrician's helper. What! No CCC?

Everybody knows today what a chase nipple is—but in 1902 Chase-Shawmut Co. of Boston had to illustrate them handsomely to their trade as Chase Nipple Combinations.

Foreign agreements—London's conditions for making 100- to 200-volt lighting changeovers covered by 12 installation rules. Those doing such changes solemnly referred to as undertakers. Such hazards! Tsk! Tsk!

The "Black Book" for listing guzzling wiremen urged by A. M. Pere as a solution for employers' associations beset with too much corn-on-the-job.

Journeyman with thumb wedged in pipe, crew pulling hard at other end — rescued after bad injuries, by quick-thinking helper. Journeyman fined $10 at next meeting for letting helper render assistance with journeyman work.

PROTECT

your jobs with Security—the quality tape that never lets you down! Always uniform . . . non-drying . . . backed by U. S. Rubber . . . the name you know and trust! Stick with Security . . . Security will stick by you!

NON-RAVELING
STRAIGHT TEARING
HIGH TENSILE STRENGTH
HIGHLY INSULATING
STRONG ADHESION

US
United States Rubber Company

SHERMAN
RIGID
GROUND
FITTINGS

GF3

• Adjustable to any position. Made in 6 types and a variety of sizes for any requirement. Absolute protection for ground wire connections. Solder or solderless. Dependable — practical — economical.

Sold by Jobbers

• Send for bulletin.

H. B. SHERMAN MFG. CO.
BATTLE CREEK, MICHIGAN

MINERALLAC HANGER

Conduit 3/8"—2 1/2"
Cable to 2 1/8" (with Bushings)

MINERALLAC JIFFY CLIP

Sizes from .250" O.D. Tubing to 1 1/4" conduit.

See your Jobber

New York City Office
Theodore B. Dally
50 Church Street

MINERALLAC ELECTRIC CO.
25 N. Peoria St., CHICAGO

News of NECA

[FROM PAGE 76]

rectly opposite the existing Code rules.

These special copies are printed on 8½" x11" letter size sheets, with a 1½" margin on the left side of the sheet and a 4" margin on the right and will be bound in loose-leaf form, so that the 4" blank space on each page and the blank page on the back of the opposite sheet will be available for recording notes. Code committees of NECA Chapters can obtain copies of the Code in this form for committee work from NECA headquarters at a cost of $1.50 per copy.

MOTOR TERMINAL ENCLOSURES

Under the sponsorship of the Motor and Generator Section, NEMA, a Joint Committee has been created, consisting of representatives of National Electrical Manufacturers Association, National Electrical Contractors Association, National Machine Tool Builders Association and the International Association of Electrical Inspectors for the following purpose:

To make a study of motor terminal enclosures with a view to making recommendations with regard to wiring space and with regard to dimensions and knockouts.

NECA has appointed as its representatives on this Joint Committee—

H. W. Watts, McNutt, Watts & Tankard, Inc., New York City.

John L. Flagg, Watson-Flagg Engineering Corp., New York City.

UTILITY MEN JOIN E.I.P.C.

New utility members have been appointed to the Electrical Industry Promotion Committee, that has been working for a year, under the chairmanship of Earl Peak, president of NECA, trying to further local cooperation and market development in the electrical industry. The following power company men now will be helping with this constructive program—G. E. Whitwell, vice president, Philadelphia Electric Company, C. E. Michel, vice president, Union Electric Company of Missouri, and B. F. Weadock, vice president and C. E. Greenwood, commercial director of the Edison Electric Institute.

REGISTRATION FOR REA WORK

At the request of the Rural Electrification Administration, in Washington, NECA is compiling a registered national list of contractors qualified for REA work. Members of NECA interested in bidding on REA work have been invited to file their names and addresses with NECA Headquarters Office, giving any supplemental information that they desire regarding their experience, equipment or size, and location of projects upon which they would be interested in figuring.

In the earlier stages in the release of REA projects for bids, the Administration at Washington made separate application to NECA for the names of qualified electrical contractors located within reasonable proximity to each specific project. The increasing number of projects has made this procedure impractical and in its place REA has invited the preparation of a national list of qualified electrical contractors to whom requests for bids may be submitted.

SURVEY OF WAGE RATES

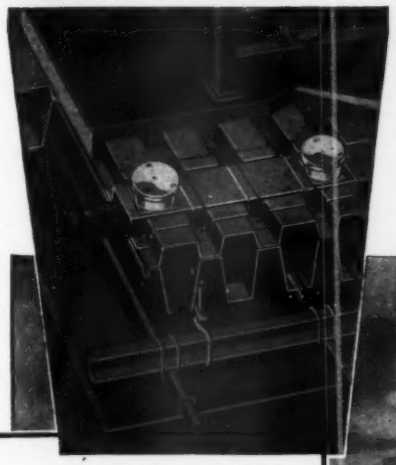
On July 1st NECA issued to all members the annual "Survey of Prevailing Open Shop and Union Shop Wage Rates", listing the wage rates in effect in 978 cities throughout the United States and Canada as of June 1, 1937. The highest wages in the country are paid in the State of New Jersey where 73 cities and towns report union shop wages for journeymen as $1.81½ per hour and for helpers $.94½. In 21 other cities and towns in New Jersey the wages for journeymen are $1.75 per hour and for helpers $.87½.

Cities of over 200,000 population throughout the United States, listed according to their size, reported the following union shop wage rates:

City	Population in thousands	Union Shop Rate per Hour Journeymen
New York	7,154	$1.70
Chicago	3,490	1.70 New Work 1.25 Res., Remodel. 1.12½ Maintenance
Philadelphia	1,972	1.37½
Detroit	1,666	1.37½
Los Angeles	1,354	1.12½–1.00
Cleveland	918	1.50
St. Louis	830	1.50 Class A 1.10 Class B
Baltimore	817	1.37½–1.10
Boston	787	1.50
Pittsburgh	678	1.65
San Francisco	656	1.25
Milwaukee	599	1.30–.92½
Buffalo	584	1.25
Washington, D. C.	497	1.65
Minneapolis	477	1.25
New Orleans	471	1.25
Cincinnati	460	1.40–1.25
Newark	447	1.75
Kansas City	412	1.37½
Seattle	374	1.50
Indianapolis	372	1.38–1.00
Rochester	333	1.37½
Jersey City	319	1.81½
Houston	317	1.50
Louisville	317	1.12½
Portland, Ore.	309	1.25
Columbus	299	1.12½
Toledo	298	1.65
Oakland	295	1.25
Denver	293	1.43
Atlanta	280	1.25–1.00
Dallas	278	1.25–1.00
St. Paul	277	1.25–1.20
Birmingham	273	1.25
Akron	265	1.25–1.20
Memphis	261	1.25
Providence	255	1.15
San Antonio	243	1.00
Omaha	217	1.25
Syracuse	214	1.25
Dayton	206	1.65
Oklahoma City	201	1.00

Material for this department is supplied by the headquarters staff of the National Electrical Contractors Association, 420 Lexington Avenue, New York.

RUN YOUR WIRES THROUGH THESE HOLLOW CELLS



THIS CELLULAR CONSTRUCTION DOES THE JOB!

Notice the hollow cells of exceptionally generous capacity! Here is the secret of the amazing electrical availability of the Robertson Steel Floor. Outlets can be cut in at almost any place desired . . . over the entire floor area.

* * *

VIEW OF A *large office in the new building of the Scranton Electric Company, Scranton, Pa., in which the Robertson Steel Floor is used throughout. The entire floor area of this room is electrically available, permitting the placement of electrical outlets at any location desired.*

New Wiring Method Means More Comprehensive and Flexible Layouts

THE Robertson Steel Floor, composed of hollow, parallel cells, with its specially designed headers, is a new and better method of wiring distribution. Each hollow cell of the floor may serve as an individual, roomy wireway for wiring distribution . . . and outlets can be cut in almost anywhere over the entire floor area.

Unique in electrical availability, the Robertson Steel Floor insures your customers' buildings against premature electrical obsolescence, equips them to take care of all present and future electrical needs. Its many advantages — both structural and electrical—make even the most comprehensive layouts easy to handle.

Both you and your customer will readily appreciate the advantages that the Robertson method of wiring distribution brings with it. Get full details about the amazing possibilities it offers you. Write today for a free copy of our brochure, "Wiring Robertson Cellular Steel Floor." Address your request to H. H. Robertson Co., 2003 Grant Building, Pittsburgh, Pennsylvania.

ROBERTSON STEEL FLOOR SYSTEM

UMI

With the MANUFACTURERS

G.E. Home Bureau Appointments

C. W. Stuart has been appointed assistant manager of the General Electric Home Bureau, New York. He will also continue his duties as secretary of the Appliance Sales Committee.

The appointment of two new field representatives for the Home Bureau has also been announced. Hugh J. Lunny, formerly with Caswell, Inc. and the G-E Supply Corporation will cover field contacts in Detroit. Randolph L. Ruhley, formerly with Cleveland Vibrator Co., will represent the Home Bureau in Cleveland.

•

Ideal Commutator Dresser Co., Sycamore, Ill., has bought out the "Revolution Counter" business of the Belden Manufacturing Co. Hereafter, this product will be marketed and manufactured by Ideal at Sycamore.

•

S & M Lamp Co., of Los Angeles, has moved to new and larger quarters at 119 West 36th Place.

•

Bunting Brass & Bronze Company, Toledo, announces the promotion of Grank G. Breisacher to assistant sales manager of the replacement and maintenance products department. E. L. Edwards has joined this organization as salesman, to succeed Mr. Breisacher in the Michigan territory.

•

Dave Wilkus has joined the Harnischfeger Corporation as sales engineer in the Chicago territory.

•

Mercoid Personnel Changes

The Mercoid Corporation, Chicago, has transferred Bassett Lerch from Chicago factory to St. Louis, Mo. His address is 8787 Bridgeport Ave., Brentwood, St. Louis County, Mo.

Russell MacDonald has joined the Boston office, located at 25 Ivy Street.

Paul J. Provost is now located at its Philadelphia office, 3137 N. Broad St.

Ajax Flexible Coupling Company, Westfield, N. Y., has appointed Roloff Engineering Co. as its Milwaukee sales representatives. The headquarters are at 610 W. Michigan St., Milwaukee.

•

McGill Manufacturing Co., of Valparaiso, Ind., announces the appointment of V. L. Warren, in charge of sales for the electrical division for the states of North and South Dakota, northern Wisconsin and Minnesota, with headquarters in Minneapolis. Al Schultz will cover the states of Missouri, southern Illinois, Indiana, Kentucky and Western Ohio from the factory in Valparaiso.

•

Allen-Bradley Co., Milwaukee, has appointed the Nickerson Machinery Co. to handle its line of motor control equipment in Utah, southern Idaho and western Wyoming. Nickerson Machinery Co. is located at 110 W. Second South St., Salt Lake City.

ECONOMICAL FLOODLIGHTING —As an experiment, Westinghouse Lamp Company has installed four 100 watt sodium vapor floodlights, on a roof, opposite the front of its Bloomfield laboratory. These 800 watts of sodium lamps light up the 12,000 square feet of surface, as brightly as 2,000 watts of filament lamps, because against dark surroundings, the sodium light brings out the details of the building in sharp relief. The annual lighting bill for four hours burning per night, figured at .05¢ a kwh, will amount to $58.40. Lamp replacements will average three per year.

Ward Leonard Appointments

Ward Leonard Electric Co., Mount Vernon, N. Y., announces the following appointments—

John S. Clark will represent them in the eastern half of Arizona, state of New Mexico and western portion of Texas. His headquarters will be El Paso.

Triangle Equipment Co. of 50 Church St., New York, and 330 South Jefferson St., Chicago, as representatives for sale of its motor starters, controllers, contactors and disconnect switches.

Brance-Krachy Co., 4411 Navigation Boulevard, Houston, Texas, are representatives for the southeastern portion of Texas.

•

Stromberg Electric Co., Chicago, announces the re-election of Ward R. Hickock as vice president and also his appointment as general manager. Other officers elected were R. H. Matthiessen, president; A. J. Wilson, vice president; and E. S. Ostler, vice president.

•

The Abolite Division of the Jones Metal Products Company, West Lafayette, Ohio, is going to hold a sales conference from August 21 to 26. Technical problems will be discussed and factory trips will demonstrate the engineering and fabrication of reflectors.

•

Promotions at Colt's

Dwight G. Phelps, manager of the electrical division of the Colt's Patent Fire Arms Manufacturing Company, Hartford, Conn., has been appointed vice-president in charge of that division. Coincident with Mr. Phelps' new appointment, F. T. Moore, vice-president, has been named first vice-president of the company; H. D. Fairweather, treasurer, also becomes a vice-president; and B. F. Conner, manager of the plastics division, became vice-president in charge of that division.

•

Century Electric Company is moving its New York office to the Underwood Building, 30 Vesey Street.

•

R. S. Hopkins has been appointed manager of the New York Sales Office of the General Cable Corporation, 205 East 42d Street.

•

Wylie Brown, president of Phelps Dodge Copper Products Corp., has announced the placing of a contract for the erection of an addition to the plant of the Habirshaw Cable and Wire Division at Yonkers, N. Y. The new plant will manufacture all types of insulated power cables.

AND ELIMINATION OF FIRE HAZARD

Wind Motors with Deltabeston Asbestos-insulated Magnet Wire

Your customers like the superior performance of Deltabeston. They appreciate . . . and profit by . . . the added service of this Asbestos-insulated Magnet Wire.

For lasting reliability there is nothing like Deltabeston. Every motor wound with it will *hum its praises* . . . year after year.

Deltabeston is insulated with PURIFIED, FELTED Asbestos. This insulation is firm, tough, durable . . . will withstand pressure and resist abrasion. It is the ready choice of motor owners and operators because it eliminates fire hazards.

Boost your reputation and your profits by using Deltabeston. Use it on every rewinding job. Win the future business of your customers through its elimination of fire hazard, its long life and its above-average performance.

Send for complete information and samples of Deltabeston Magnet Wire. Write to Section Y-888, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut. Deltabeston Wire and Cable is distributed nationally by General Electric Merchandise Distributors and Graybar Electric Company.

GENERAL ELECTRIC

DELTABESTON WIRE AND CABLE

APPLIANCE AND MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONN.

UMI

Equipment NEWS

Mercury Vapor Fixer

Dual-purpose mercury vapor or incandescent lamp fixture. Two-piece reflector body permits quick and easy lamp installation or replacement. Cover glass permanently seals reflector mouth. Uses either one 750-1500 watt incandescent lamp or one 400 watt mercury vapor lamp. Two types available—concentrating, for lighting of high narrow bays; spread, for use at lower mounting heights, where more light is desirable on vertical surface. Wheeler Reflector Co., Inc., 275 Congress St., Boston, Mass.

WHEELER MERCURY VAPOR FIXTURE

■

Oil Blast Circuit Breaker

Type FK-45 oil blast circuit breaker is non-oil-throwing, with plate steel rectangular tank separating chamber, internal mechanism, silver-to-silver main contacts, easily renewable arcing contacts, oil blast baffles and Herkolite bushings. 75,000 kv-a. interrupting rating. Available in three current sizes, 600, 1,200 and 2,000 amperes. Tank construction makes it applicable for heavy duty and small space. General Electric Co., Schenectady, N. Y.

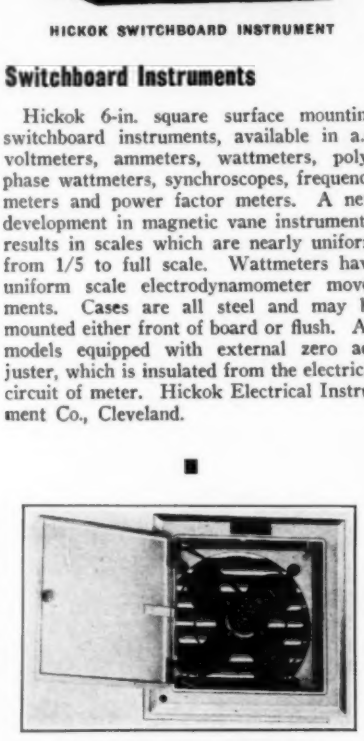
G-E OIL BLAST CIRCUIT BREAKER

HICKOK SWITCHBOARD INSTRUMENT

Switchboard Instruments

Hickok 6-in. square surface mounting switchboard instruments, available in a.c. voltmeters, ammeters, wattmeters, polyphase wattmeters, synchroscopes, frequency meters and power factor meters. A new development in magnetic vane instruments, results in scales which are nearly uniform from 1/5 to full scale. Wattmeters have uniform scale electrodynamometer movements. Cases are all steel and may be mounted either front of board or flush. All models equipped with external zero adjuster, which is insulated from the electrical circuit of meter. Hickok Electrical Instrument Co., Cleveland.

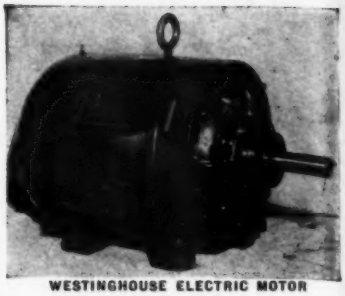
■



EMERSON ELECTRIC VENTILATOR

Wall Ventilator

Available in built-in wall box for permanent installations or with portable metal panel. Ideal for home or office. Has an air moving capacity of 875 cubic feet of air per minute. Can be installed in new homes at time of construction or in modernized homes. Emerson Electric Manufacturing Co., St. Louis, Mo.



WESTINGHOUSE ELECTRIC MOTOR

Squirrel-Cage Motor

Dual ventilated, fan cooled, type CS squirrel-cage motor, designed for use in automobile factories, foundries, cement plants, coal timples, machine shops, steel mills, chemical plants, dye houses, and where severe service is required. Protected against abrasive dust, moisture and corrosion. Motor frame contains air, internal and external ducts, heat exchanger principle. Fresh grease enters outside edge at top of bearing and excess or used grease is discharged at bottom inner edge. Cartridge type bearings are protected when rotor is removed. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

■

RALCO EXPLOSION PROOF UNIONS AND FITTINGS

Unions and Fittings

Concentric "V" grooves and ridges in both members of the union, which increase the width of the metal to metal seat on conduit unions. Type U and UM unions are used in combination with junction boxes. Threaded and tapped ends are standard taper conduit threads. UM type used in various openings of junction boxes. U type used when two sections of conduit are to be joined. Ralco Manufacturing Co., 123 N. Albany Ave., Chicago, Ill.

■

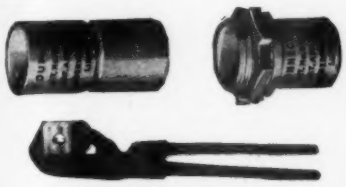
Immersion Heater

An immersion heater for handling over the side of plating tank. Casings made of copper, steel or other alloys and lead coated, when required for nickel plating, chromium plating, acid copper and acid zinc baths. A new process claimed for putting lead on unit to give lead a denser value and better heat conductivity and increased resistance to action of chemicals in bath. Rated at 3-kw. 230-volts. Harold E. Trent Company, Philadelphia, Pa.

TRENT IMMERSION HEATER

E.M.T. Couplings, Connectors

Couplings and connectors for electrical metallic tubing, which are secured to the tubing by a special "indentor" tool. Couplings join two lengths of tubing; connectors join end of tubing to outlet box. Jaws of indentor tool have two opposing points which clamp into the sleeve and press down on the tubing, causing an indentation in both. Two opposite indentations used on ½ and ¾-inch fittings, four indentations on 1 and 1¼-inch fittings. Cadmium plating prevents corrosion. Indentor tool has interchangeable jaws for use with different size tubing. Briegel Method Tool Co., Galva, Ill.



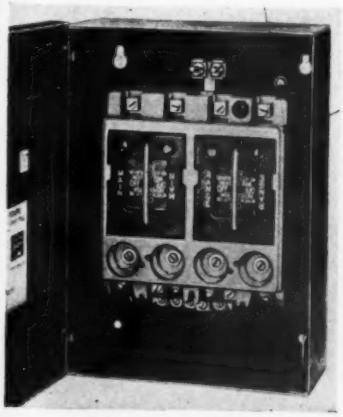
BRIEGEL COUPLINGS AND CONNECTORS

■

Pull-Out Service Switch

New 7RL4 Noark unit, providing in one assembly a main switch, range switch, 4 circuits of lighting and a 35 or 60-amp. tap for water heater or bus extension. Design provides compact and efficient device, with unit block on sub-base, removable for wiring by loosening one screw. Centralized assembly in cabinet, enabling main entrance switch to be located at top or reversed to locate main and range circuits at cabinet bottom. Additional wiring space available between rear wall of cabinet and unit block, permitting all wires to be pulled in and shaped up without block in place. Pull-out fuse holders have heavy wire handle and post-type solderless connectors to speed up installation. One screw provided to keep main cover closed, assuring use of the auxiliary cover for fuse replacement, giving safety "dead front" advantages.

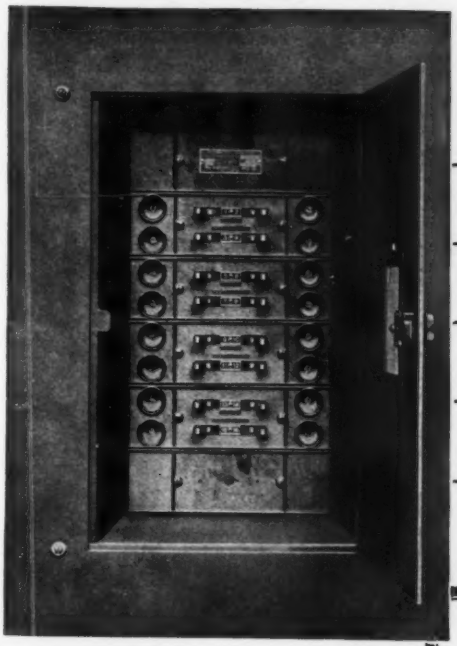
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.



COLT'S PULL-OUT SWITCH

WW

THE CONTRACTOR BUILDS HIS BUSINESS ON QUALITY



★

BUY WURDACK PRODUCTS AND BE SURE

★

WURDACK PANELBOARDS

• A complete line of Dead Front Lighting Panelboards, constructed of standardized sections of moulded Bakelite. All switches and fuse receptacles are readily removable from front of panel. All Cabinets made of Code Gauge Galvanized Steel. Fronts of full finished cold rolled steel, rust-proofed with black lacquered finish.

WURDACK *quality is your answer to satisfaction and profits.*

• A complete line of panelboards, circuit breaker panels, distribution panelboards, and remote control stage switchboards all designed to most effectively meet today's requirements. Outstanding features such as: design simplicity and ruggedness of construction make this line a most dependable one. The materials used throughout insure durability. This line is widely used and performance results make each selection of Wurdack equipment a wise one.

WM. WURDACK ELECTRIC MFG. CO.

4444 CLAYTON AVE., ST. LOUIS, MO.

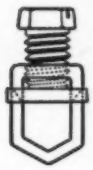
SALES OFFICES IN PRINCIPAL CITIES

SIMPLE, ISN'T IT?

ILSCO

SOLDERLESS CONNECTOR

NOTICE: The ***triangular wedge*** formed by the tang and V-bottom collar, which forces the wire into a ***solid mesh***—



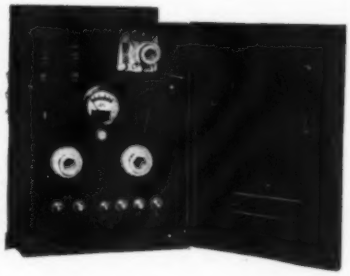
NO set-screw contact . . .
NO flattening or separating of wires . . .
NO limitation to one size wire . .
NO shearing effect whatsoever . .
NO special tools required to make connection . . .

NO need for you to search any longer for the PERFECT Solderless Connector—WE HAVE IT!

Ilsco solder lugs show the size of the largest wire they will take.

FREE—A large display board, containing mounted samples of ILSCO lugs. Sent upon request.

ILSCO COPPER TUBE & PRODUCTS, INC
5629 Madison Road. Cincinnati, Ohio



Replace troublesome batteries

with a

TELENCO ELIMINATOR

Use it for telephone systems, intercommunicating phones, dial systems, relays and other devices that require a low voltage, pure direct current.

- No chemicals or moving parts.
- Even "hum-free" direct current.
- Special voltage control feature.

Write for Bulletin BET-101

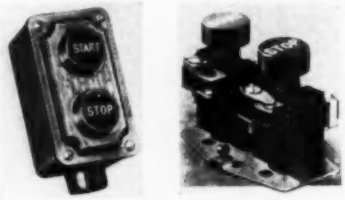
TELENCO-ELECTRICOIL CO.
287 BROADWAY, NEW YORK, N. Y.

Equipment NEWS

[FROM PAGE 83]

Control Station

A general purpose push button control station built for long, trouble-free service. Liberal size pure silver contacts, mounted on moulded bakelite base. Box is tapped for conduit entrance. Wiring is accessible by removing cover without disturbing conduit connections. Buttons are colored moulded bakelite with functions designated. Wide number of contact arrangements available with button markings suitable for almost every industrial purpose. Monitor Controller Co., Baltimore, Md.

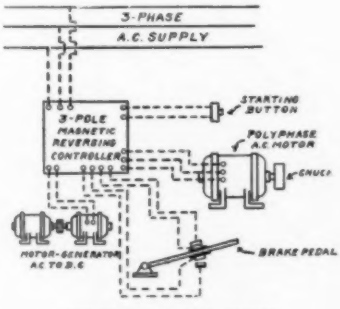


MONITOR CONTROL STATION

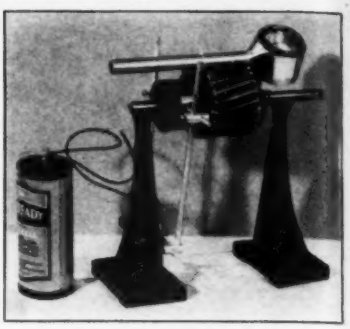
■

Dynamic Motor Brake

A dynamic-brake-motor control, for stopping chucks, on machines having 220 volt three-phase squirrel-cage motors, directly connected to the chuck. A three-pole double-solenoid-controlled switch with upper and lower positions for starting and stopping-and-braking control, is interlocked so only one can be closed at a time. Starting connects a.c. supply. On applying the stop-and-brake control, the lower solenoid closes, one blade connected to the a.c. supply, and two fed from d.c. at about 34 volts. D.c. may be regulated from 6 to 50 volts. Substitution of d.c. for a.c. causes the normally rotating field to become stationary, thus inducing a high braking current in the rotor circuit. As the rotor revolves slower, less current is induced in it by the stationary field. Reliance Electric & Engineering Co., Cleveland, Ohio.



RELIANCE A.C.-D.C. BRAKE



SWAM "ARMOTESTER" STAND

Armature Tester

"Armotester" stand for testing armatures. Cast iron stand with V top to hold shaft. Electrodes on universal joints allow contacts to be made to any point on the commutator and locked to allow rotation. Spring movement permits contact on irregular surfaces. R. E. S. Swam & Co., Hanover, Pa

■

Twin-Plug Pull Socket

No. 993 brass sockets have two plug outlets independent of the pull-chain switch controlling the lamp holder. Connecticut Electric Mfg. Co., Bantam, Conn.

CONNECTICUT TWIN-PLUG SOCKET

■

ERICSON PORTABLE LAMP GUARD

Lamp Guard

C&E super-duty portable hand lamp designed for heavy duty service in industrial plants and railroads. Handle No. 7H has a ¼-in. thickness of wall to protect and insulate the heavy duty insert socket with its cord grip clamp. Special backed lacquer finish, reduces oil and acid deterioration and makes it oil resisting. Ericson Manufacturing Co., Cleveland, Ohio.

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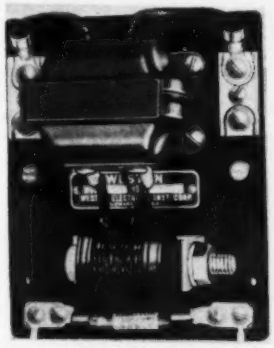
Transformer-Rectifier Unit

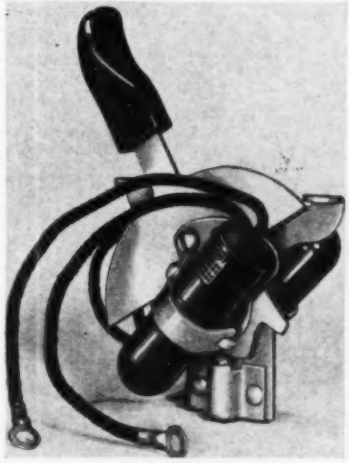
The "Rectiformer," a unit combining 110-volt a.c. transformer and copper oxide rectifier, designed to provide 6-volt d.c. power supply for power relay operation. Output of transformer is 120 milliamps continuous, or 200 milliamps intermittent. Features are—Protective resistor across output; for uses in which 6-volt circuit is opened and closed; wiring arranged to eliminate possibility of improper connections. Known as Model 9980. Weston Electrical Instrument Corp., Newark, N. J.



WESTON "RECTIFORMER"

Remote Control Switch

Universal control switch mechanism designed for mounting to rear of a panel. With only switch handle protruding, it gives finger tip, master control over motor circuit contactors, safety and limit switches. One or more non-breakable metal mercury tubes are clamped in screw down clips, selectively yet permanently positioned. Each tube will make and break a circuit of 15 amperes and 125-volt a.c. rating without exposed arcing through countless cycles. Comparative ratings on higher a.c. or d.c. voltages render tubes readily adaptable to commercial circuits. Jefferson Electric Co., Bellwood, Ill.



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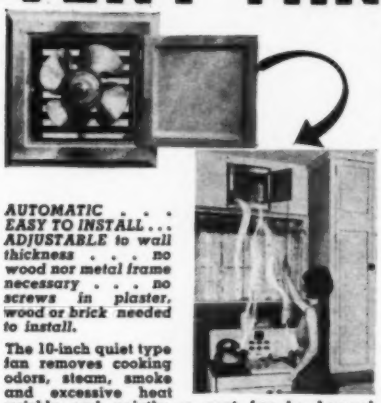

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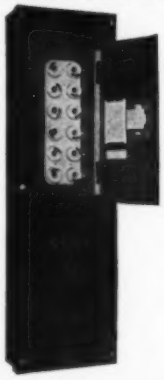

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